

A REVISION OF THE GENUS *DELOMERISTA*
(HYMENOPTERA: ICHNEUMONIDAE)

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Delomerista Foerster belongs to the Tribe Theroniini, subfamily Pimplinae (=Ephialtinae). Some authors tend to place it in a different tribe Delomeristini, but as Carlson (1979) has stated, there is really no evidence of its relationship either way, and therefore it is here left within the tribe Theroniini, as it is placed by Townes (1969).

Delomerista is a moderate-sized genus of Holarctic distribution. Species of it parasitise saw-fly cocoons, though in literature there are records of their being parasitic upon lepidopterous hosts as well as on a weevil. More recent studies on the genus are those of Walkley (1960) on the North American species and of Kasparyan (1977) on the European species. Additional species have been discovered from India, Europe, and North America in the collections of Townes, Gupta, Canadian National Collection, and of the U. S. National Museum. Some of the American species appeared to have previously been mixed up. Types and authentic determined specimens of several European, Japanese and American species were studied to elucidate their taxonomic relationships and identities. This resulted in the recognition of several new species which occur sympatrically with common species like *D. novita*, *borealis*, etc. and were previously mixed up with them, in the separation of *D. japonica* and *D. diprionis* as valid species, and the discovery of *D. indica*, n. sp., from the Himalayan mountains of India. *D. indica* extends the range of the genus to India.

A total of 17 species and 4 subspecies are now recognized, of which 6 taxa are new to science.

Genus *DELOMERISTA* Foerster

Delomerista Foerster, 1869. Verh. Naturh. Ver. Rheinlande, 25: 164.

Type-species: *Pimpla mandibularis* Gravenhorst; designated by Schmiedeknecht, 1888.

Taxonomy: Walkley, 1960: 362-372. Townes, 1969: 127. Kasparyan, 1977: 69-74.

Biology: Morris, et al., 1937: 360-361.

Body black. Face and clypeus of male yellowish-white (except in *laevis*). Moderately slender, medium-sized species. Face a little convex and minutely to moderately strongly punctate. Scape punctate. Clypeus usually lighter colored than face, flat (convex in *D. laevis*), its apical margin concave and without a median tooth. Mandibular teeth equal. Malar space 0.25 to 1.0 the basal width of mandible, yellow. In males malar space correspondingly shorter than in females. Flagellar segments with linear sensillae which are often absent on the basal one or two segments. Thorax usually subpolished and with

minute setiferous punctures. Notauli indicated anteriorly. Epomia present. Prepectal carina present. Propodeum areolated, both longitudinal as well as transverse carinae present, but only the carinae bordering areola and petiolar areas prominent. Costula present or absent, or indistinct and its place indicated by the different sculpture of first and second lateral areas; second lateral area often somewhat depressed and rough. Apical transverse carina almost circular and more prominent. Tarsal claws simple, of moderate size, without an enlarged bristle having a spatulate tip (cf. *Theronia*), though a long slender bristle present on each claw. Nervellus intercepted variously, at, above or below the middle (even varying within the same species). Abdomen strongly granulose, granuloso-mat, or coriaceous with small scattered hairs, or closely punctate (as in two species *pfankuchi* and *kusuoii*). First tergite with a weak to strong dorsal curvature. Median carinae usually ending at this dorsal hump. Lateral carina passing just above the spiracle and often weak at this point. Ovipositor moderately compressed, moderately long (0.7 to 1.0 the length of abdomen), or very long (2.0 the abdomen in *longicauda*), its tip not sinuate but variously modified, either nodiform, or upper valve thick, or upper valve occupying a greater part of the depth of ovipositor tip (figs. 47-49, 51-53). The apical slope of the upper valve also variable and of diagnostic value for species.

HOST ASSOCIATIONS

Species of *Delomerista* seem to be chiefly ectoparasitic on pupating sawfly larvae within the cocoons. Host records of many species are lacking, while some species have been reported ectoparasitic upon a variety of lepidopterous larvae, and even a weevil larva (*Mononychus vulpeculus* for *D. novita*). Aubert (1969), quoting Kolomiets, 1962) even mentions *D. mandibularis* as being hyperparasitic upon larvae of *Rhogas dendrolimi* Matsumura, through *Dendrolimus sibiricus*. Most authors, however, believe that all hosts other than sawfly hosts are probably erroneous, as they are not confirmed by subsequent rearing records. For the same reason, Walkley (1960) stated that it is unwise to disregard the host records from Lepidoptera and Coleoptera until further rearings are done.

LARVAL MORPHOLOGY

(Figs. 63-65)

The Larvae of *Delomerista* have a large tooth-like projection at the junction of the blade and base of mandible. According to Short (1978) this character is found among other genera of the Theronini, in the Rhyssini, certain Ephialtini, and in the Orthopelmatinae. The epistoma is incomplete, hypostoma and hypostomal spur well sclerotized, lateral parts of labial sclerite slender and ventral part broad, about twice as deep as the width of lateral part. Maxillary and labial palps flattened and disc-shaped. Labral sclerite complete. Mandible with a broad base and its blade bifurcated—the longer part with dorsal and ventral teeth and smaller part toothless. Maxillary and labial palps with two sensillae each. Closing apparatus of spiracle not adjoining atrium. Antenna papiliform. Length of skin setae equal to the larger toothed part of mandibular blade.

Short does not separate out Delomeristini from Theroniini.

SPECIES

A list of species so far known, together with their host associations as far as known, is given below, including the new taxa described in the text. Species no longer valid, nor belonging to *Delomerista* are placed within brackets []. Only valid species are numbered.

Four species groups are recognized, chiefly on the nature of the ovipositor tip. They are the Novita Group, the Japonica Group, the Frigida Group, and the Mandibularis Group. They are characterized and keyed in the key that follows the species list. The figures of the ovipositors should help identify the species-groups as well as the species.

[*Ephialtes albicinctus* Desvignes, 1862]. Type ♂, ?Great Britain (London). Name preoccupied. A synonym of *Delomerista mandibularis* Gravenhorst cf. Fitton (1978).
?Great Britain. Host: Unknown.

[*Pimpla bilineata* Brullé, 1846]. Type ♀, Algeria (Paris). Oehlke (1967) synonymized it under *Coccygomimus contemplator* (Mueller) with a query, but Aubert (1969) placed it under *Delomerista*. The latter situation followed by Constantineanu & Pisica (1977). According to original description, apparently a species of *Coccygomimus*.
Algeria. Host: Unknown.

1. *Delomerista borealis* Walkley, 1960. Type ♀, N.W.T. (Washington). Also reported from Alaska and Quebec by Walkley. Aubert (1969) placed it under *D. mandibularis* with a query. Kasparyan (1977) reported it from the European USSR. A valid species belonging to the Novita Group. Occurring in Northwestern parts of North America and European USSR. Host: Unknown.

[*Ephialtes desvignesii* Marshall, 1870]. New name for *E. albicinctus* Desvignes, 1862. Oehlke (1967) placed it under *Delomerista*. Fitton (1978) placed it as a synonym of *D. mandibularis* (Gravenhorst).
England. Host: Unknown.

2. *Delomerista diprionis* Cushman, 1939. Type ♀, Ontario, Canada (Washington). Walkley (1960) synonymized it under *D. japonica* Cushman. Hereby considered as a valid species, belonging to the Japonica Group. Nearctic. Hosts: Several species of *Diprion*, *Neodiprion* and *Gilpina*, including *D. similis*, *N. lecontei*, *N. nanulus nanulus*, *N. pratti banksianae*, *N. sertifer*, *N. tsugae*, *Gilpina frutetorum*, and *G. hercyniae*.

3. *Delomerista excavata* Ulbricht, 1913. Type ♀, Germany (?). Aubert placed it under *mandibularis* with a query, while other authors are not certain about its identity.

The type could not be located and therefore its taxonomic identity could not be ascertained.

Germany. Host: Unknown.

4. *Delomerista frigida* Kasparyan, 1977. Type ♀, European USSR (Leningrad).
Belongs to the Frigida Group.
Eastern Palaearctic. Host: Unknown.

[*Delomerista gelida* Walkley, 1960]. Type ♀, N.W.T. (Washington).
Hereby synonymized under *D. mandibularis* Gravenhorst. N. SYN.
Nearctic. Host: Unknown.

5. *Delomerista indica* Gupta, new species. Type ♀, Himalaya: Dalhousie (Gupta).
Belongs to the Japonica Group.
India (Himalayan mountains). Host: Unknown.

6. *Delomerista japonica* Cushman, 1937. Type ♀, Japan (Washington).
Walkley (1960) synonymized *D. diprionis* Cushman under it, but both species are here considered distinct but related, belonging to the Japonica Group.
Japan. Host: *Diprion nipponicus*.

7. *Delomerista kusuoii* Uchida & Momoi, 1957. Type ♀, Japan (Sapporo).
A valid species related to *D. pfankuchi* and belonging to the Novita Group.
Japan. Host: Unknown.

[*Pimpla laevifrons* Thomson, 1877]. Type ♂, Germany (Lund).
Townes (1944) synonymized it under *D. texana* (Cresson), while Oehlke (1966) synonymized *texana* under *laevis* (Gravenhorst).
Aubert (1969) considered it distinct and synonymized *strandii* Ulbricht under it. Constantineanu and Pisica (1977) treated it as a separate species. Kasparyan (1977) studied the lectotypes of *laevis* and *laevifrons* and confirmed the synonymy of this species. *D. strandii* is not a synonym of it, though a cotype of it is conspecific with it. The lectotype of *strandii* is different.
Europe. Host: Unknown.

8. *Pimpla laevis* Gravenhorst, 1829. Type ♀, Italy (Wroclaw).
= *laevifrons* Thomson.
= *texana* Cresson (cf. Oehlke, 1966).
A cotype of *D. strandii* belongs here, which is different from the lectotype of *strandii* designated by Oehlke, 1967.
A valid species, belonging to the Mandibularis Group.
Holarctic. Hosts: *Rhyacionia buoliana* (Lep.: Tortricidae) in Europe (cf. Aubert). Carlson (1979) does not mention any host in North America.

9. *Delomerista lepteces* Walkley, 1960. Type ♀, Alaska (Washington).
Belongs to the Novita Group.
Nearctic. Host: Unknown.

10. *Delomerista longicauda* Kasparyan, 1973. Type ♀, Russia (Leningrad).
A species belonging to the Mandibularis Group. A subspecies of it (*longicauda americana*) is described from Northern Nearctic. Holarctic. Host: Unknown.
11. *Pimpla mandibularis* Gravenhorst, 1829. Lectotype ♀, Poland (Wroclaw).
= *albicinctus* Desvignes (cf. Fitton, 1978)
= *desvignesii* Marshall (cf. Fitton, 1978)
= *gelida* Walkley (new synonym).
Aubert (1969) placed *excavata* Ulbricht as a synonym of it with a query, but Kasparyan (1977) did not confirm this synonymy. He also placed *D. borealis* Walkley as a doubtful synonym of it, apparently after the suggestion of Walkley herself, which was because of misdetermined specimens of *mandibularis* in Washington. In Washington there are specimens from Europe determined as *mandibularis* by Roman and Heinrich, which are specifically identical with the specimens of *borealis* Walkley, but not with specimens determined as *mandibularis* by Perkins and Kasparyan.
According to Oehlke (1967), Perkins selected a lectotype in 1936 and so labelled the specimen, which was subsequently designated lectotype by Oehlke (1967). Kasparyan (1977) followed this interpretation. Oehlke mentions Breslau, Poland as the lectotype locality, while Kasparyan mentions Warmbrunn, Poland!
A valid species belonging to the Mandibularis Group.
Hosts: As mentioned by Aubert from Europe: *Strongylogaster* sp., *Euura amerinae* (Hym.: Tenthredinidae).
12. *Delomerista masoni* Gupta, new species. Type ♀, Michigan (Townes).
Belongs to the Mandibularis Group.
Nearctic. Host: Unknown.
13. *Pimpla novita* Cresson, 1870. Type ♀, Mass. (Philadelphia).
Kasparyan (1977) reported it from European USSR.
A valid species belonging to the Novita Group. A new subspecies of it (*novita europa*) is described from Poland and Kasparyan's specimens may belong to the European subspecies.
Holarctic. Hosts: *Mononychus vulpeculus* (Curculionidae), *Acrobasis rubrifasciella*, *Acrobasis* spp., *Exartema olivaceanum*, *Eublemma minima* (= *Thalpochara carmelita*) (Lepidoptera). *Macremphytes* sp., *Diprion similis* (Hymenoptera).
14. *Delomerista pfankuchi* Brauns, 1905. Type ♀, Bremen (Berlin).
Troctocerus unicolor Hedwig, 1959. Syn. by Horstmann, 1981.
Europe. Russia. Walkley (1960) reported it as 'Probably America', but it does not occur in the Nearctic Region.
Valid species belonging to Novita Group.
Palaeartic. Hosts: *Chionodes tragicella*, *Psyche viciella*, *Talaeporia tubolosa*, and *Diplodoma marginepunctella* (Lepidoptera). *Diprion pini* (Hymenoptera).
15. *Pimpla strandi* Ulbricht, 1911. Lectotype ♀, Norvegia (Berlin).
Lectotype designated by Oehlke, 1967.
Another cotype conspecific with *laevifrons* and so labelled by Aubert,

led him to consider the two synonymous.

A valid species, also occurring in the Nearctic Region. Belongs to the Mandibularis Group.

Holarctic. Host: Unknown.

[*Pimpla texana* Cresson, 1870]. Type ♀, Texas (Philadelphia).

P. laevifrons considered as a synonym of it by Townes (1944), while Oehlke (1966) synonymized it under *laevis* (Gravenhorst).

A synonym of *Delomerista laevis*.

Nearctic. Host: Unknown.

16. *Delomerista townesorum* Gupta, new species. Type ♀, Michigan (Townes).
Belongs to the Frigida Group.

Nearctic. Host: Unknown.

[*Troctocerus unicolor* Hedwig, 1959]. Holotype ♀, 'Paitzkofen b. Straubing.

A junior synonym of *Delomerista pfankuchi*, vide Horstmann, 1981.

17. *Delomerista wakleyae* Gupta, new species. Type ♀, Alaska (Townes).
Belongs to the Frigida Group.

Nearctic. Host: Unknown.

MALES

The matching of the males with the females has posed a problem, as most males available look alike and apparently males of several species are unknown. Attempts have been made to identify the males in association with the females. This resulted in certain broad groupings. These groupings are described below and should aid in the identification of the males.

I. Males with face black, yellow only on sides. Malar space long, 0.8 to 1.0 the basal width of mandible. Clypeus convex. Abdominal tergites finely granular. Only one species, *Delomerista laevis*, belongs here.

All other males so far as are known, have face yellowish-white, or white, malar space 0.2 to 0.33 the basal width of mandible, and clypeus flat.

II. Areola small, broadly triangular due to the apical transverse carina being close to the middle of propodeum. Propodeum short, sloping from base to apex. Apical transverse carina often the strongest and very convexly arched. This group includes the males of the Japonica Group, *D. japonica*, *diprionis*, and *indica*, all of which have yellow malar space, tegula and ventral aspects of scape and pedicel. *D. diprionis* has the strongest apical transverse carina, which even encroaches the basal half of propodeum.

III. Propodeum smooth and shiny, with areola horse-shoe shaped, not elongate. Costula distinct. Propodeal carinae rather strong and sharp. Malar space, scape and pedicel ventrally, and tegula yellow. Flagellum brownish. Propodeum with a short dorsal face. Hind femur usually wholly brownish-yellow. Includes *D. masoni* of the Mandibularis Group.

IV. Areola elongate. Costula indistinct to absent. Propodeum long, smoother, or granulose laterally. Apical transverse carina of propodeum

usually in apical 0.3 of propodeum. Dorsal face of propodeum long and not sloping. Propodeum sloping only apicad of transverse carina. The rest of the known males belong here.

A. Tegula black. Scape and pedicel black. *Delomerista borealis* belongs here.

B. Tegula yellow. Malar space black. Three species, *D. novita*, *longicauda* and *lepteces* belong here. In *D. novita*, the scape and pedicel are yellow ventrally, malar space short, 0.2 the basal width of mandible, nervellus intercepted at lower 0.4, face as long as wide, fore and middle coxae generally white, and hind femur short, compressed and largely reddish. In *D. longicauda americana* (male of nominate subspecies unknown), the scape and pedicel are black, malar space 0.33 the basal width of mandible, nervellus intercepted at lower 0.3, face wider, about 1.5 as wide as long, shiny, fore coxa alone white, and hind femur normal, largely to wholly blackish or blackish-brown. *D. lepteces* is very much like *D. longicauda*, but malar space 0.3 as long as basal width of mandible, face 1.3 as wide as long, dull, and hind femur is largely reddish-brown or reddish, except in apical 0.3.

C. Tegula yellow. Malar space yellow. *Delomerista townesorum* and *D. mandibularis* belong here. Both these species show variations in the coloration of scape, pedicel, and in the markings on the femora.

D. townesorum has a rugulose, rectangular face, hind femur with a black apical ring, and nervellus intercepted at its lower 0.4 to 0.45 (appears usually in the middle).

D. mandibularis generally has a smoother, squarish face, hind femur usually wholly orange-brown, and nervellus intercepted in the lower 0.3 to 0.35. The scape and pedicel are usually yellow ventrally. There are variations, however. Some males have a rugulose face and scape appears partly to largely black. A large number of males from British Columbia in Townes Collection are tentatively placed here. They may be different.

V. Abdomen rugoso-punctate. The male of *D. pfankuchi* has a rugoso-punctate abdomen, like that in female (all other males have coriaceous abdomen), scape and pedicel yellow ventrally, flagellum brownish and hind femur wholly orange colored.

In the key that follows, only the females have been taken into consideration. *D. excavata* Ulbricht is unknown to me and therefore not included in the key, nor in the text.

KEY TO THE SPECIES GROUPS AND SPECIES OF DELOMERISTA

(Females only. *Delomerista excavata* Ulbricht excluded)

1. Ovipositor with a distinct subapical node whence it tapers gradually to a point (figs. 3, 6, 9). Ventral margin of upper valve of ovipositor concave subapically where the lower valve widened and occupying the greater part of the depth of the ovipositor. Basal ridges on lower valve strongly inclined and rest of the ridges somewhat sinuate. Basal two flagellar segments with several rows of sensillae (cf. Frigida Group) (figs. 12, 15, 18, 19, 20). (In one species, *lepteces*, ovipositor finely tapered and needle-like, fig. 16). A. The Novita Group. 4

- Ovipositor tip not nodiform, a little bulbous or more conspicuously widened (often a few low ripples seen in profile on the upper valve, figs. 23, 28). Upper valve heavier or wider preapically than the lower valve and occupying the greater part of the preapical depth of ovipositor. Ventral margin of upper valve convex. Ridges on lower valve (except the basal 3-4) almost vertical to reclining. 2
2. Upper valve of ovipositor not unusually heavy or widened, with an even gradual slope and with one or two ripple-like preapical formations (figs. 23, 28). Ridges on lower valve vertical (except the basal ones). First flagellar segment almost devoid of sensillae or only one or two present. II segment with fewer sensillae. (This group is sympatric with the Novita Group and the American species of it have been mixed up with the species of the latter. The ovipositor looks somewhat similar, but is definitely not nodiform and is a little bulbous in outline and sensillae are virtually absent). Propodeum with a flat dorsal face and then sloping only in apical half. B. The Frigida Group. 8
- Upper valve of ovipositor heavier and widened preapically, bulbous or with a short abrupt apical slope (figs. 33, 38, 39, 44, 47-49, 51-53). Apical ridges on lower valve vertical to reclining. Sensillae on basal two flagellar segments numerous or sometimes fewer in number. Propodeum sloping from base to apex, though sometimes basal part convex (figs. 40, 50, 54). 3
3. Upper valve of ovipositor bulbous in outline, widened preapically and then abruptly sloping (figs. 33, 38, 39, 44), with faint ripples. Apical ridges on lower valve reclining while the basal ones inclining. The two valves meeting almost in a straight line: this line at mid height of ovipositor at base and usually faint. Basal two flagellar segments with numerous sensillae (figs. 31, 32, 36, 37, 45, 46). Propodeum in profile view with an even slope from base to apex (fig. 40). C. The Japonica Group. 10
- Upper valve of ovipositor rather heavy, and occupying the greater part of the depth of ovipositor (figs. 47-49, 51-53), and without or with only faint ripples. Apical slope abrupt, short, except in *longicauda* (fig. 53), where ovipositor 2.0 as long as abdomen. Ovipositor usually arched. Ridges on lower valve vertical to slightly inclined (basal 3 ridges strongly inclined). The two valves meeting along an arched line, which is conspicuous throughout the length of ovipositor and is above the mid-height at base of ovipositor. Basal two flagellar segments with fewer sensillae (fig. 59-60). Propodeum in profile view (figs. 50, 54) strongly convex basally and then abruptly sloping to apex. D. The Mandibularis Group. 12
- (The Novita Group)
4. Abdomen closely punctate (figs. 5, 11). Apical margins of tergites banded with yellow or red. Malar space 0.25 the basal width of mandible. Propodeum subpolished and with a few scattered punctures to punctate (figs. 4, 10). Costula faint to distinct.
- Abdomen granulose to granuloso-coriaceous (figs. 2, 8, 14), without apical pale bands on tergites. Malar space 0.3 to 0.5 the basal width of mandible. Propodeum polished to subpolished. Costula absent. 6

5. Propodeum (fig. 4) subpolished, with a few scattered punctures laterally. Costula very faintly indicated. Abdominal tergites with yellow apical bands. Nervellus intercepted below the middle. Palaearctic.
4. pfankuchi Brauns (p. 15)
- Propodeum (fig. 10) punctate, second lateral area rugoso-punctate. Costula distinct. Abdominal tergites apically banded with red and punctation coarser than in *pfankuchi* (fig. 11). Nervellus intercepted at its middle. Japan. 5. kusuoi Uchida & Momoi (p. 16)
6. Ovipositor finely tapered apically, needle-like (fig. 16), nodus rather indistinct. Malar space 0.45-0.5 the basal width of mandible. Propodeal areola (fig. 13) horse-shoe shaped. Nearctic.
3. lepteces Walkley (p. 15)
- Ovipositor typical for the group with a distinct node and then long tapering (figs. 3, 9). Malar space 0.3-0.45 the basal width of mandible. Propodeal areola usually elongate, more strongly defined and pentagonal (figs. 1, 7). 7
7. Tegula yellow. Hind tibia yellow ventrally or at base. Hind tarsus basally yellow. Abdomen granuloso-coriaceous (fig. 2). Malar space 0.3 the basal width of mandible. Nervellus intercepted at its lower 0.3-0.4. Holarctic. 1. novita (Cresson) (p. 11)
- Tegula black. Hind tibia and tarsus wholly black. Abdomen granulose (fig. 8). Malar space 0.4-0.45 the basal width of mandible. Nervellus intercepted at its lower 0.4-0.45. Holarctic.
2. borealis Walkley (p. 14)

(The Frigida Group)

8. Face granuloso-punctate medially. Tegula black. Tergite I convex, granulose laterally, its dorsal and lateral carinae weak and confined only along the basal declivity. Fore leg wholly reddish-brown. Europe.
6. frigida Kasparyan (p. 18)
- Face subpolished, with or without fine punctures. Tegula black or yellow. Tergite I flattened laterally and more rugulose rather than granulose, its median and lateral carinae distinct. Fore leg with yellow ventral marks. North America. 9
9. Tegula black. Propodeum rugulose in pleural area, second lateral area and in petiolar area. Legs dark reddish-brown with fore leg brownish (except rarely). Malar space 0.5 the basal width of mandible. Ovipositor long, a little up-curved and longer than abdomen. Abdomen granulose. Nearctic. 7. walkleyae, n. sp. (p. 18)
- Tegula yellow. Propodeum smoother to subpolished, particularly in lateral and petiolar areas. Legs light yellowish-brown. Malar space 0.3-0.4 the basal width of mandible. Ovipositor as long as abdomen, usually straight. Abdomen granuloso-mat (finer than in *walkleyae*). Nearctic. 8. townesorum, n. sp. (p. 19)

(The Japonica Group)

10. Ovipositor tip a little swollen preapically and then abruptly sloping (short taper, fig. 33, 39). First abdominal tergite thinner in profile view, its dorsomedian carinae angled at 30° and with a conspicuous flange at its junction with lateral carina. Basal declivity smoother and shiny. Postpetiole flat and rugulose. Malar space 0.33 to 0.45 the basal width of mandible. Eastern Palaearctic: Japan, USSR.
 10. japonica Cushman (p. 22)
 Ovipositor tip in profile view more parallel-sided, with a small convex slope (figs. 38, 44). First tergite convexly arched, its median carinae moderately raised and making an angle of 45° with the horizontal axis, not conspicuously flanged at base. Malar space 0.5-0.7 the basal width of mandible. 11
11. Malar space 0.6-0.7 the basal width of mandible. Nervellus intercepted below the middle (lower 0.33). Junction of median and lateral carinae of first tergite not flanged, the lateral carina angled at spiracle and usually erased there or apically. Basal declivity of first tergite dull. Ovipositor tip as in fig. 38. Nearctic. . 9. diprionis Cushman (p. 20)
 Malar space 0.5 the basal width of mandible. Nervellus usually intercepted at the middle (some exhibit variations 0.5 ± 0.15). Junction of median and lateral carinae of first tergites moderately flanged, the lateral carina complete and strong, arched at spiracle. Basal declivity of first tergite rough. Ovipositor as in fig. 44. India.
 11. indica, n. sp. (p. 23)

(The Mandibularis Group)

12. Malar space about as long as or longer than basal width of mandible (0.8 in σ). Clypeus convex. Face smooth (face of male black). Propodeum largely granulose. Abdominal tergites finely granulose (shagreened in σ). Ovipositor tip as in fig. 52. Holarctic.
 15. laevis (Gravenhorst) (p. 28)
 Malar space 0.4-0.6 the basal width of mandible. Clypeus flat. Face with minute punctures, subpolished. 13
13. Ovipositor very long, longer than the body and about 2.0 the length of abdomen. Ovipositor tip upcurved, narrowed preapically (fig. 53). Holarctic. 16. longicauda Kasparyan (p. 29)
 Ovipositor shorter, only about as long as abdomen or shorter, straight preapically and not narrowed. 14
14. Ovipositor almost parallel-sided in profile view, uniformly slightly arched upwards, particularly near tip, not conspicuously widened preapically (fig. 48, 49). First flagellar segment almost devoid of sensillae (fig. 59) (one or two in a row sometimes present). Ovipositor as long as abdomen. Holarctic. . . 12. mandibularis (Gravenhorst) (p. 24)
 Ovipositor rather widened preapically (about 1:1.5) (figs. 47, 51, 52) and almost straight (or a little downcurved). First flagellar segment with several rows of sensillae. Ovipositor shorter than abdomen. . . . 15

15. Tegula black. Ovipositor very stout (fig. 47), slightly arched upwards. Malar space 0.5 to 0.6 the basal width of mandible. Areola pentagonal to a little elongate. Costula incomplete to indistinct. Second lateral area of propodeum rugose and depressed. Head as wide as high. Inner eye orbits shallowly indented. Holarctic.

13. *strandii* (Ulbricht) (p. 26)

- Tegula yellow. Ovipositor moderately stout with a weak median bend downwards. Malar space 0.4-0.5 the basal width of mandible. Areola semicircularly rounded, broader (sometimes elongate). Costula complete and distinct. Second lateral area of propodeum shiny (sometimes rugulose), generally not depressed. Head wider than high. Inner eye orbits moderately indented. Nearctic. . . 14. *masoni*, n. sp. (p. 27)

A. THE NOVITA GROUP

Flagellum with sensillae, basal two flagellar segments with numerous sensillae which are sometimes fewer in number.

Propodeum long, with a longer dorsal face. Propodeum dorsally smoother. Areola elongate. Costula absent or faintly indicated (distinct in *kusuo*i, where propodeum is somewhat punctate). Ovipositor tip nodiform, seen in profile upper valve with a slight protuberance subapically whence it evenly tapers to an apical point. At nodus, depth of upper and lower valves about equal; beyond this point lower valve slightly encroaching upon the upper valve and lower margin of upper valve concave. Ridges on lower valve (except the basal ones) vertical and slightly sinuate. Ovipositor 0.8 to 1.2 as long as abdomen.

This group includes five species: *D. pfankuchi* from Europe, *D. kusuo*i from Japan, *D. lepteces* from North America, and *D. borealis* and *D. novita* from Europe as well as North America.

1. DELOMERISTA NOVITA (Cresson)

Female: Face convex, punctate in the middle. Clypeus flat. Malar space 0.3-0.33 the basal width of mandible. Head a little wider than long. Eye moderately strongly notched a little above antennal socket. Frons smooth. Vertex with minute setiferous punctures. Interocellar distance 0.6-0.7 the ocellocular distance. First flagellar segment with linear sensillae. Second and third segments also with linear sensillae. Sensillae on basal two flagellar segments in *novita europa* fewer in number. Mesoscutum subpolished and more hairy than other parts. Pronotum, mesopleurum and metapleurum shiny, polished and with scattered hairs. Propodeum smooth dorsally and a little punctate laterally and in pleural area, a little rough in the petiolar area. Areola fully formed, but basal area and costula absent (fig. 1). Apical transverse carina circular and strong. Dorsal face of propodeum appears flat and about as long as its apical slope, which is gradual. Nervellus intercepted at its lower 0.3-0.45. Abdomen granuloso-coriaceous (fig. 2). Ovipositor long, straight, parallel-sided, about 0.5 as long as body and 0.8 as long as abdomen, its tip with a subapical node and thence evenly and gradually tapered to a point. Lower valve with vertical ridges (fig. 3), with basal ridges inclined.

Male: Similar to the female but face smooth. Pleural area of propodeum often rugulose. Propodeum dorsally flatter and more elongate and often with minute punctures.

Two subspecies are recognized: *Delomerista novita novita* from North

America and *D. novita europa* from Europe. They differ as follows:

1. Sensillae on basal flagellar segments numerous. Areola generally hexagonal and a little longer than wide (though in reared specimens variations are seen from elongate \cap -shaped to somewhat broadly triangular). Legs reddish-brown with fuscous and pale marks. Fore and middle tarsi fuscous, their tibiae particularly the middle tibia, ventrally yellow and with apical fuscous marks. Hind tibia largely yellowish-white ventrally. Nearctic. 1a. novita novita (Cresson) (p. 12)
- Sensillae on basal two flagellar segments fewer in number. Areola usually elongate, narrowed basally, and somewhat pentagonal. Legs more uniformly brownish. Fore and middle tibiae and tarsi without fuscous or pale marks. Hind tibia wholly brownish-black and only with a basal white ring. Europe. 2b. novita europa, n. subsp. (p. 13)

1a. DELOMERISTA NOVITA NOVITA (Cresson) (figs. 1-3)

Pimpla novita Cresson, 1870. Trans. Amer. Ent. Soc., 3: 146. ♀. des. Type ♀, Massachusetts (Philadelphia). Homotype examined in Townes Coll., 1980.

Taxonomy: Walkley, 1960: 373. Kasparyan, 1977: 74. Carlson, 1979: 349.

Morphology: Finlayson, 1967: 1247 (larva). Short, 1978: 25,174 (larva).

Female: Basal flagellar segments with numerous sensillae. Areola generally hexagonal and a little longer than wide, but areola variable, particularly in reared specimens, from elongate \cap -shaped to somewhat broad-triangular.

Black. Mandible, malar space, palpi, hind corner of pronotum, tegula, and fore trochanter and trochantellus, yellowish-white. All coxae, femora, and middle and hind trochanters and trochantellus reddish-brown, with fore coxa often dark brown. Fore and middle tibiae reddish-brown, with their ventral surface yellowish-white. Hind tibia with a yellowish-white annulus at base, black dorsally, and yellowish-white ventrally, which mark variable, but not extending to apex. Fore tarsus brown and middle and hind tarsi black. Base of hind basitarsus white. Apical 0.22 of hind femur black. Sometimes legs more uniformly reddish-brown, but hind tibia and tarsus exhibit the characteristic pattern.

Male: Malar space 0.2 to 0.25 the basal width of mandible and black. Face and clypeus white. Face subpolished, with scattered punctures. Scape and pedicel white ventrally. Tegula yellowish-white. Fore and middle coxae and trochanters white. Middle femur ventrally and middle tibia often wholly white. Hind femur short, reddish-brown with a blackish mark in apical 0.25 to 0.4 and merging with the reddish color of femur. Sometimes fore leg darker with coxa brownish.

One female labelled, "*Delomerista gracilis* Cushman, Type", "No. 19179-USNM", from Santa Cruz, California, is a variant specimen of *novita novita* with legs more reddish-brown, areola triangular, dorsal face of propodeum shorter, and apical transverse carina of propodeum more strongly arched. Some reared specimens of *novita novita* from Wisconsin also exhibit this sort of propodeum and a flatter first tergite.

Length: ♀, 9-13 mm. Fore wing 7-9.5 mm. Ovipositor 5-7 mm. ♂, 7-11 mm. Fore wing 4.5-8 mm.

Specimens: 29♂ males and 59♀, from the Nearctic Region: *British*

Columbia (Hudson Hope, Robson, and Stone Mt. Park); *California* (Santa Cruz Mts.); *Michigan* (Ann Arbor, Brevort, Emmet Co., Huron Mts., Houghton Co., Iron River, Marquette Co., Schoolcraft Co., Roscommon Co.); *Minnesota* (Stacy and Chisago Co.); *New Hampshire* (Mt. Madison, Pinkham Notch, and White Mts.); *New Jersey* (High Point State Park); *New York* (Farmingdale, Hancock, L. Sebago, Moss Lake, Oneota); *North Carolina* (Linville Falls); *Ontario* (Bells Corners, Chaffeys Locks, Constance Bay, Cumberland, and Ottawa); *Oregon* (Mt. Hood and Selma); *Pennsylvania* (Bald Eagle State Park, Hamilton, Spring Brook), *Quebec* (Gracefield, Knowlton, Lacoste, Lac Mondor, Cap Rouge, Gracefield, Ste Flore, and Sweetsburg); *South Carolina* (Cleveland); *Vermont* (Laurel Lake); *Virginia* (Mountain Lake); *West Virginia* (Cranberry Gls.); *Wisconsin* (Gibson Lake, Madison, and Polk Co.); and *Yukon Territory* (Rampart House).

Specimens reported by Walkley (1960) from Saskatoon, Sask., Robson, BC, and Golden Lake, Ontario, are now referred to *Delomerista townesorum*, n. sp. Specimens reported by her from Maine, Maryland, Massachusetts, Connecticut and Washington could not be examined.

Hosts: The host records on specimens seen are from *Diprion similis* at Gibson Lake, Wisconsin, Stacy, Minnesota, and at Linville Falls, N.C., the adults occur mostly during August. Walkley reported other host records (quoting earlier authors), like *Mononyhus vulpeculus*, *Acrobasis rubrifasciella*, *Exartema oliva* and *Eublemma minima*, stating that the last two records are doubtful and the collector and identifier are not given. Finlayson (1967) records this species from *Acrobasis* (Phycitidae).

Distribution: This species is widely distributed in Eastern North America. It ranges northwestwards to British Columbia and Yukon Territory. In these areas it is partially replaced by a closely related species, *D. borealis* Walkley.

1b. *DELOMERISTA NOVITA EUROPA*, n. subsp.

This subspecies is extremely close to the nominate subspecies from the Nearctic Region, but the hind tibia and tarsus are black except for whitish basal rings, in which character it somewhat approaches *Delomerista borealis*.

The distinguishing characters are: Sensillae on basal two flagellar segments fewer in number. Propodeum smoother dorsally. Areola elongate, narrowed basally, almost pentagonal in outline. Nervellus intercepted in lower 0.3-0.45. Hind corner of pronotum yellow. Tegula yellow, with a brownish spot near wing base. All coxae, trochanters and femora brownish, shiny. Fore and middle tibiae and tarsi brown. Hind femur only faintly infuscate apically. Hind tibia and tarsus wholly black except for narrow basal yellowish-white rings.

Male has the usual characters like face, scape and pedicel ventrally, fore and middle leg wholly, and hind tibia ventrally, yellowish-white. Hind femur black only apically. Malar space 0.2-0.25 the basal width of mandible, black. Nervellus intercepted at lower 0.25-0.3.

This subspecies has been confused with *D. mandibularis* Gravenhorst, according to misdeterminations of Roman and others. Specimens reported as *novita* by Kasparyan (1977) probably belong to this subspecies. His specimens were not checked.

Length: ♀, 11-13 mm. Fore wing 9-11 mm. Ovipositor 6-7 mm. ♂ 9-11 mm. Fore wing 6-8 mm.

Holotype: ♀, *Germany*: Bayr. Wald Waldmunchen, 800 m, VII-1948,

G. Heinrich (labelled *D. mandibularis*) (TOWNES).

Paratypes (2♂, 9♀): *Germany*: Hahnheide b. Trittau, near Hamburg, 1♀, VIII-1945, G. Heinrich (Townes). Fürstenberg i.M., Fr. W. Konow, 4♀, Baker Collection (one det. as *mandibularis*) (Washington). *Austria*: Osterich-Tal. Allgau, 1100 m, 1♀, 31-VII-1949, G. Heinrich (det. *mandibularis*) (Townes) *Poland*: 1♀, ex *Diprion similis* (abnormal, propodeum and abdomen banded with red) (Washington). *Sweden*: Skåne, Trap 2, 1♀, VII-1969, B. Svensson (Townes). Messaure, 1♂, 27-VI-1971, K. Muller; Loderupstrandbad, 1♂, 9-VI-1961, M. Townes & C. West (Townes). *England*: Oxford, Bagley Woods ♀, 25-IX-1960, H. K. Townes (Townes).

Host: *Diprion similis*.

Distribution: Germany, Austria, Poland, Sweden, England, and probably U. S. S. R.

2. DELOMERISTA BOREALIS Walkley (figs. 7-9)

Delomerista borealis Walkley, 1960. In Townes and Townes: Bull. U. S. Natl. Mus., 216(2): 370. ♀. Type ♀, NWT: Long 141° W, Lat 69° 20' N (Border of Alaska and Yukon Territory) (Washington). Examined in 1980. Paratypes from Alaska, Yukon Territory, North-western Territory, Quebec, and Colorado.

Taxonomy: Kasparyan, 1977: 71.

This species is extremely similar to *D. novita* and could well be considered as a subspecies of the latter, but for distributional overlaps and a few structural differences, as follows:

Female: First flagellar segment with fewer rows of sensillae. Face smoother and with sparser punctures. Inner margin of eye only slightly indented opposite antennal socket. Frons more deeply excavated. Malar space 0.4 to 0.45 the basal width of mandible. Nervellus intercepted at its lower 0.4 to 0.45. Propodeum subpolished. Areola more rounded basally and elongate than in *novita*. Abdomen granulose. Ovipositor longer, about 0.75 to 0.8 as long as the body, and often longer than the abdomen.

Black. Malar space and mandible white. Hind corner of pronotum black, or white at its junction with tegula. Tegula black. Legs more uniformly reddish-brown with fore coxa and trochanters often blackish-brown. Middle tibia and tarsus fuscous. Hind tibia and tarsus black, the tibia often with a small white spot dorsally near base. Apex of hind femur sometimes blackish.

Male: Face and clypeus white, with clypeus black margined. Malar space yellow, 0.3 the basal width of mandible. Tegula black. Scape and pedicel black. Flagellum blackish. Hind tibia often yellow underneath. Hind femur black on apical 0.2, this black mark rather sharply contrasting with the reddish-brown color of femur.

Length: ♀, 7-13 mm. Fore wing 5.5-9 mm. Ovipositor 6-9 mm. ♂, 7-11 mm. Fore wing 5-8 mm.

Specimens examined: 12♂ and 40 ♀ from the Nearctic Region, from the following localities: *Alaska* (Anchorage, Deering, Isabella Pass, Mt. McKinley, Valdez); *British Columbia* (Racing River, Stone Mt. Park); *Colorado* (Poudre Lake, Fall River Pass in Rocky Mt. Nat. Park and Gould); *Northwest Territories* (North Shore of Lac Mounoir, Mackenzie River Delta, Norman Wells, and Tuktoyaktuk); and *Yukon Territory* (Dawson, Dempster Highway, mile 51, Herschel Island).

Walkley (1960) also reported this species from Quebec, Canada. Kasparyan (1977) reported it from European USSR. These specimens have not been seen.

Three paratypes of this species from Rampart House (YT), Raindeer Depot, Mackenzie Delta, (NWT), are now assigned to another species, *D. walkleyae*, n. sp.

Host: Unknown.

Distribution: Northwestern parts of North America and also in U.S.S.R.

3. *DELOMERISTA LEPTECES* Walkley (figs. 13, 14, 15, 16, 19)

Delomerista lepteces Walkley, 1960. In Townes and Townes: Bull.

U. S. Natl. Mus., 216(2): 368. ♀. Type: ♀, Alaska: Mt. McKinley, 1600 ft (Washington). Examined in 1980. Paratypes from Quebec and Colorado.

This species is characterized by having a slender ovipositor with a pointed and needle-like tip, both valves tapering apically and lower valve with weak teeth. Other characteristic features of the species are:

Female: First flagellar segment (fig. 15) with one or two rows of sensillae, about 1.4 the second segment. Face with indistinct punctures, leathery in appearance. Malar space 0.45-0.5 the basal width of mandible. Propodeum a little rough and shiny dorsally, sparsely and shallowly punctate laterally. Areola horse-shoe shaped. Petiolar area rugulose. Costula absent. Second lateral area somewhat depressed. Nervellus intercepted at its lower 0.33. Discoidella bent down in the middle (in other species it is straight or only weakly curved). First tergite granulose, its lateral carina incomplete, partly erased apicad of spiracle. Ovipositor fine, needle-like, about 0.6 as long as the body length and only a little shorter than the abdomen (0.87).

Black. Mandible, malar space and palpi yellowish-white. Clypeus brown. Hind corner of pronotum elongately yellow. Tegula yellow to brownish. Fore coxa black. Fore femur and tibia black dorsally and yellow ventrally. Fore tarsus blackish-brown. Middle and hind coxae reddish-brown. Middle tibia and femur yellow in front, with their apices and tarsus brownish-black. Hind femur reddish-brown with apical third of it and hind tibia and tarsus black except for one or two yellow spots on tibia ventrally.

Male: Face and clypeus white. Face wider. Malar space black, 0.3 the basal width of mandible. Scape and pedicel black. Flagellum black. Tegula yellow. Hind femur reddish or reddish-brown with a blackish mark on apical 0.3. Propodeal areola weaker than in the female.

Length: ♀, 8-10.5 mm. Fore wing 7-8 mm. Ovipositor 4-5 mm. ♂, 8-9 mm.

Specimens: *Alaska*: Mt. McKinley, 1♀ (type) (Washington). *British Columbia*: Stone Mt. Park, 3800±ft., 1♀, 20-VII-1973, ♂, 12-VII-1973, H. & M. Townes (Townes). *Colorado*: Poudre Lake, Rocky Mountain National Park, 1100 ft., 1♀ (paratype), 12-VIII-1948, H. G. & D. Townes (Townes).

Host: Unknown.

Distribution: Alaska, Quebec, British Columbia, and Colorado. Specimen from Quebec not seen.

4. *DELOMERISTA PFANKUCHI* (Brauns) (figs. 4, 5, 6, 20)

[*Pimpla*] (*Delomerista*) *pfankuchi* Brauns, 1905. Ztschr. Syst. Hym. Dipt., 5: 131. ♀. des. Type ♀, Bremen, Germany (Berlin). Examined in 1980.

Troctocerus unicolor Hedwig, 1959. Nachr. Naturw. Mus. Aschaffenburg, 62: 96. ♀. Syn. by Horstmann, 1981. South Italy and Turkey.
Taxonomy: Walkley, 1960: 371. Kasparyan, 1977: 74.

The ovipositor of this species is also long tapered but the lower valve is more tapered apically than the upper valve and has more distinct teeth along its tapered part. This species is distinctive in having the abdominal tergites closely irregularly punctate, rather than granulose or coriaceous.

Female: Antenna 32 segmented. Subapical segments a little longer than wide. First flagellar segment with two rows of two or three sensillae each. Malar space 0.25 the basal width of mandible. Interocellar distance equal to ocellocular distance. Face minutely punctate. Mesopleurum and metapleurum shiny and with scattered minute punctures. Propodeum subpolished, with a few scattered punctures laterally. Areola elongate, more pentagonal. Propodeal carina not strong. Costula faintly indicated, rather weak. Abdomen closely irregularly punctate. Nervellus intercepted in lower 0.35. Ovipositor as long as abdomen, its tip with a weak node, long tapered apically.

Blackish-brown. Two small marks on face below antennal sockets, mandible, hind corner of pronotum, tegula, and apical margins of second and the following tergites, yellow; these bands wider on succeeding tergites. Malar space yellowish-brown. Legs yellowish-brown. Hind tibia and tarsus blackish-brown, with small yellow spots at base of tibia, underneath in middle of tibia, and at base of first and second trochanteral segments.

Male: Face, clypeus, mandible, and malar space, yellow. Face more convex and punctate. Scape and pedicel yellow ventrally. Second lateral area of propodeum a little rough. Costula more prominent than in female. Tegula yellow. Fore and middle legs pale-yellow. Hind tibia yellowish-white and only apically black. Hind femur orange colored. Abdomen rugoso-punctate, with narrow apical brownish bands.

Length: 8 mm. Fore wing 7.5 mm. Ovipositor 5 mm.

Specimens: *Germany*: Bremen, 1♀ (type), ex *Psyche viciella*, ex Coll. Pfankuch (Berlin). *Poland*, 1♂, ex *Diprion similis*, 28-VIII-1938 (Washington). Specimen reported by Walkley not examined.

Distribution and Hosts: According to Oehlke (1966) this species is Holarctic and has been reported as parasitic on diprionid cocoons (*Diprion pini*) by Sitowski (1925) and de Fluiter (1932) in Poland and Netherlands, respectively. Aubert (1969) reported this species from Germany, Poland and Netherlands, mentioning the following hosts: *Chionodes tragicella* (Gelechiidae), and *Diprion pini* L. (Diprionidae). Kasparyan (1977) reported it from European USSR.

A male, reared from *Diprion similis* in Poland (U.S.N.M.) has punctate banded abdomen and is placed here. A female with the same data, however, has granulose abdomen and is more like *D. novita europa*, although it has banded abdomen, which is never the case in *novita*.

This species does not occur in the Nearctic Region. The specimen reported by Walkley as from "W.Va." must have come from Europe. This specimen has not been examined.

5. *DELOMERISTA KUSUOI* Uchida & Momoi (figs. 10, 11, 12, 17, 18)

*Delomerista kusuo*i Uchida & Momoi, 1957, Insecta Matsumurana, 21(1-2): 10. des., fig. Type ♀, Japan: Kyoto (Sapporo). Examined in 1980.

This species was described from two females from Kyoto. It is related to *D. pfankuchi* Brauns in having a punctate abdomen and a tapered ovipositor with a subapical nodus. It also has the two yellow subantennal marks on face as in *pfankuchi*. *D. kusuo*i, however, is larger and stouter with body black rather than brownish, with narrowly red apical bands on abdominal tergites, and propodeum densely punctate and strongly carinate. Other important diagnostic characters are:

Female: Antenna longer, 41-segmented, subapical segments short, and thick, as long as wide (cf. *pfankuchi*). Basal flagellar segments with numerous sensillae. Interocellar distance about 1.3 the ocellular distance. Face punctate. Middle lobe of mesoscutum a little elongate anteriorly. Propodeum densely punctate. Second lateral area rugose. Areola apically tending to be rugose. Areola well defined, rounded basally and broadly horse-shoe shaped. Costula distinct and complete, though low as compared to other carinae. Apical transverse carina bounding the petiolar area very strong. Abdomen punctate, more strongly so than in *pfankuchi*.

Black. Antenna ventrally, two triangular spots below antennal sockets, base of mandible, malar space, tegula, and fore and middle legs, yellowish-brown. Antenna a little darker. Hind coxa and femur reddish-brown, its trochanters yellowish-brown, its tibia black dorsally and apically and yellowish ventrally, its tarsus blackish-brown with base of first segment yellowish-brown. Hind femur blackish at extreme apex. Abdomen black with narrow, faintly reddish apical bands, particularly on second to fifth segments. Intersegmental membranes, where visible (fifth segment onwards), yellow.

Male: Unknown.

Length: ♀, 13 mm. Fore wing 10.5 mm. Ovipositor 6 mm.

Specimen: *Japan*: Kyoto (Honshu), 1♀ (type), 29-X-1955, Kusuo Iwata (Sapporo).

In the original description the month of collection mentioned is May. There was also a paratype with the same data, which has not been seen.

Host: Unknown.

Distribution: *Japan*.

II. THE FRIGIDA GROUP

First flagellar segment without sensillae or only one or two present. Second segment with few sensillae. Malar space 0.4 to 0.5 the basal width of mandible. Notauli deeper than in Novita Group. Propodeum rough. Petiolar area rugulose. Areola as long as wide, sometimes longer. Second lateral area depressed and differently sculptured. Costula indicated by a wrinkled line. Propodeum with a dorsal flat face, not evenly sloping to apex. Oblique grooves on second tergite shallower than in Novita Group. Ovipositor tip not compressed, a little bulbous. Upper valve not nodiform, slightly thicker than the lower valve and with one or two indentations or ripple-like formations preapically whence it evenly tapers apically. Lower margin of upper valve slightly convex to almost straight (in Novita Group concave and less in depth than lower valve). Ovipositor as long as abdomen or a little longer.

The American species of this group are similar to and sympatric with the species of the Novita Group, and have been mixed up with them in the past. Besides the ovipositor tip, other useful characters are the yellow ventral aspects of fore femur and tibia and the absence or near absence of sensillae on the first flagellar segment, and the second segment also with no or fewer sensillae. The European species *frigida* Kasparyan has wholly reddish fore legs

and is closely related to the American species, *townesorum* and *walkleyae*, described below as new species.

6. DELOMERISTA FRIGIDA Kasparyan

Delomerista frigida Kasparyan, 1977. New and Little-known Insects of European U.S.S.R. Acad. Sci. USSR, 1977: 71. ♀. key, des., fig. Type: ♀, Russia (Leningrad). Paratype examined, 1980.

Female: Face somewhat granuloso-punctate medially. Malar space 0.5 the basal width of mandible. Eye only slightly indented opposite antennal socket. Thorax as usual, with mesoscutum somewhat hairy and pleural areas smooth. Metapleurum with minute punctures. Propodeum rugulose in pleural area, second lateral area and petiolar area; smooth basodorsally. Areola elongate horse-shoe shaped. Costula represented by depressions and a wavy line. Abdomen granulate. First tergite more convex and granulate laterally, its median and lateral carinae somewhat indistinct and confined around its basal declivity. Ovipositor straight, its tip a little bulbous and evenly sloping. Ovipositor about 0.75 the length of body and a little longer than the abdomen.

Black. Malar space and mandible yellow. Clypeus blackish-brown. Tegula black. Hind coxa blackish-brown. Legs reddish-brown. Middle tibia and tarsus fuscous. Hind femur and tarsus black. Hind tibia dirty white sub-basally.

Male: Unknown.

Length: ♀, 7 mm. Fore wing 6 mm. Ovipositor 5 mm.

Specimens: Russia: 1♀, (paratype) (Townes). Germany: Haag Amper, Ober Bayern, 1♀, May 1948 (det. as *D. laevis*) (Washington).

Host: Unknown.

Distribution: Palaearctic Region: U.S.S.R. and Germany.

7. DELOMERISTA WALKLEYAE, n. sp. (figs. 21, 22, 23, 24, 25)

Female: Face subpolished, with distinct minute scattered punctures. Malar space about 0.45 to 0.5 the basal width of mandible. Eye moderately indented opposite antennal socket. Thorax as usual for the genus, but mesopleurum with scattered minute punctures, which are less evident in smaller specimens. Propodeum rugulose in pleural area, petiolar area, and in second lateral area (as in *frigida*) and smoother basodorsally. Areola horse-shoe shaped. Costula faintly indicated (fig. 21). Lateral aspect of postpetiole flat to a little concave, more rugulose rather than granulate. Lateral carina more prominent than in *frigida*. Abdominal tergites finely granulate. Oblique grooves on second tergite weaker. Ovipositor long, about 0.7 as long as body and longer than abdomen, a little arched in larger specimens.

Black. Malar space and mandible yellowish-white. Clypeus brown. Hind corner of pronotum black to narrowly yellow. Tegula black. Fore leg largely blackish (type) with femur and tibia yellow ventrally. Mandible and hind coxae, trochanters, and femora reddish-brown, and their tibiae and tarsi black. Middle tibia yellow ventrally. Hind tibia dirty yellow to brownish yellow baso-ventrally (more often brownish rather than yellow). Hind femur with a narrow apical fuscous dorsal mark. Abdomen black.

Male: Unknown.

Length: ♀, 8-10 mm. Fore wing 6-7 mm. Ovipositor 5-6 mm.

Holotype ♀, Alaska: Tsaina River, 17.VIII.1973, H. & M. Townes (Townes).

Paratypes: 16♀. *Alaska*: Anchorage, ♀, 6 to 12-VII-1976, Peter A. Rush. Thomson Pass, ♀, 15-VIII-1973, H. & M. Townes (Townes). King Salmon, Naknek River, 1♀, 19-VII-1952, J. B. Hartley (Ottawa). *Northwest Territories*: Mackenzie River Delta, 68° 43' N, 134° 15' W, 2♀, 18 to 19-VII-1979, L. Humble (det. *D. borealis*) (Ottawa). Mackenzie Delta, Raindeer Depot, 1♀, 10-VII-1948, J. P. Vockeroth (paratype of *D. borealis* Walkley) (Ottawa). North Shore of Lac Maunoir, 2♀, 15-VII-1969, G. E. Shewell (Ottawa). Kovaluk R., 69° 11' N, 131° W, 2♀, 19 to 24-VI-1971, W. R. M. Mason (Ottawa). Norman Wells, ♀, 27-VI-1969, G. E. Shewell (Ottawa). *Yukon Territory*: Rampart House, ♀, 20-VII-1951 and ♀, 11-VII-1951 (paratypes of *D. borealis* Walkley), J. E. H. Martin (Ottawa). Dempster Highway, mile 51, ♀, 7 to 12-VII-1973, G. & D. M. Wood (Ottawa). *British Columbia*: Stone Mt. Park, 3800±ft., 2♀, 12 and 19-VII-1973, H. & M. Townes (Townes).

Host: Unknown.

Distribution: Northwestern Nearctic Region. Sympatric with *D. borealis*.

8. DELOMERISTA TOWNESORUM, n. sp. (figs. 26, 27, 28)

Female: Face subpolished, somewhat leathery, without distinct punctures or laterally with a few scattered punctures. Malar space 0.3 to 0.4 the basal width of mandible. Eye shallowly indented opposite antennal socket. Mesopleurum polished, with only minute setiferous punctures. Propodeum subpolished to a little wrinkled laterally. Areola as is *walkleyae*, but costula faint and second lateral area smoother. Nervellus intercepted in upper 0.4. Abdomen including postpetiole granuloso-mat. Ovipositor straight or a little upcurved, about as long as the abdomen, and 0.55 to 0.6 as long as the body.

Black. Malar space and mandible yellow. Clypeus brownish-black (sometimes face also like clypeus). Hind corner of pronotum and tegula yellow. All legs pale yellowish-brown with fore tibia dorsally fuscous and ventrally yellowish. Middle and hind tibiae yellow with dorsal and apical blackish marks. Middle and hind tarsi black with base of basitarsus yellow.

Male: Face and clypeus yellowish-white. Malar space 0.25 to 0.3 the basal width of mandible, yellow. Scape and pedicel yellow ventrally, scape often only narrowly so. Tegula yellow. Nervellus intercepted almost at its center or in upper 0.45. Fore and middle coxae yellowish-white. Hind femur reddish-brown with only its apex black marked.

Length: ♀, 7-10 mm. Fore wing 6-8 mm. Ovipositor 5-6 mm. ♂, 7-10 mm. Fore wing 6-8 mm.

Holotype: ♀, *Michigan*: Midland County, 21-31-V-1961, R. R. Dreisbach (Townes).

Paratypes (25♂, 22♀): *Michigan*: Ann Arbor, 4♀, 15 to 17-V-1960, 28-V-1962, 30-V-62, 7-VI-1962, H. & M. Townes (Townes). Schoolcraft Co., ♂, 8-VI-1960, R. R. Dreisbach. Emmet Co., 5♀, ♂, 27-V-1960, R. R. Dreisbach. Charlevoix Co., ♀, 31-V-1960, R. R. Dreisbach (all Townes). *Oregon*: Mt. Hood, 5400', ♀, 24-VII-1978, 2♂, 20-VII-1978, 1♀, 26 to 28-VII-78, H. & M. Townes (Townes). *Washington*: Mt. Rainier, 2700 ft., 2♂, 3♀, 11-VII to 16-VIII-1940, H. & M. Townes (Townes). *Arizona*: Nr. Alpine, 5♂, 24 to 29-V-1947, H. & M. Townes (Townes). *British Columbia*: Robson, ♀, 10-VI-1945, H. R. Foxlee (Townes), ♀, 24-V-1950, H. R. Foxlee (Ottawa). Stone Mt. Park, 3800±ft., 14♂, 12 to 22-VII-1978, H. & M. Townes (Townes). *Saskatchewan*: Regina, ♀, 14-VI-1940, T. B. Rempel (Townes). Saskatoon, ♀, 22-VI-1923, N. J. Atkinson (labelled *D. novita*) (Ottawa). *Ontario*: Golden Lake, ♀, 9-VI-1952, G. S. Walley (Ottawa). *Iowa*: ♀, 11-VI-1938, B. Berger (det. *D. novita*)

(Washington). *Virginia*: ?Blacksburg, 1♀ (labelled *D. novita*) (Washington).

Host: Unknown.

Distribution: This species is sympatric with *D. novita* and has been confused with the same in the past. Apparently a widespread species in North America, as is *D. novita*.

A large female from Washington: Mt. Rainier, approaches *D. walkleyae* in facial punctures, pleural punctures, but otherwise agrees with *townesorum*. Similarly a male from Emmet Co., Michigan, has black scape and pedicel, but otherwise resemble the males of *townesorum*.

C. THE JAPONICA GROUP

Basal flagellar segments with sensillae. Propodeum short and slanting, with a short dorsal face (figs. 29, 34, 41). In profile view evenly sloping from base to apex (fig. 40). Areola broadly triangular, or semicircularly arched. Region of costula linearly depressed and wrinkled, with an appearance of a carina, though costula often faint to indistinct. Apical transverse carina strongly arched and petiolar area occupying the apical half of propodeum. Petiolar area subpolished and with a few rugosities. First tergite widened basally, almost parallel-sided, or a little flanged at the junction of dorsal and lateral carinae towards base; this segment comparatively thinner and more compressed than in species of groups A and B. Median dorsal carinae not very distinct on postpetiole. Upper valve of ovipositor tip a little bulbous and widened, its apical slope abrupt, the sloping portion demarcated by two little humps on the dorsal valve, and about as long as the width of ovipositor at this point (which is the maximum width of the ovipositor). Ovipositor tip demarcated from the rest of ovipositor by a weak constriction, which appears characteristic of the group. Line of junction of upper and lower valves straight. Upper and lower valves of equal depth. Apical ridges on lower valve reclining, while the basal ones inclining. Ovipositor about 0.75 the length of abdomen.

This group includes three closely related species: *D. japonica* Cushman from Japan and USSR, *D. diprionis* Cushman from North America, and *D. indica*, n. sp. from the Himalayan mountains of India. The former two species have often been synonymized or considered subspecies of each other. A key to these species is not very satisfactory because of certain overlapping characters. Reference should therefore be made to the diagrams and descriptions of the ovipositor tips (figs. 33, 38, 39 and 44), to the shape of the propodeum (figs. 29, 34, 40 and 41), and also to the nature of the first tergite, malar space and nervellus, to separate the species.

9. DELOMERISTA DIPRIONIS Cushman (figs. 34-38)

Delomerista diprionis Cushman, 1939. J. Washington Acad. Sci., 29: 398.

♂, ♀. Type ♀, Canada: Oakville, Ontario (Washington). Examined in 1980. Hosts: *Diprion* spp., *Neodiprion* spp.

Delomerista japonica Cushman: Walkley, 1960. In Townes and Townes: Bull. U. S. Natl. Mus., 216(2): 367. Syn. in part.

Delomerista japonica diprionis Cushman: Carlson, 1979. In Krombein et al.: Catalog of Hymenoptera north of Mexico, 1: 349.

Biology: Furniss & Dowden, 1941: 49-51. Griffiths, 1960: 656. Torgeresen, 1969: 60.

Morphology: Finlayson, 1960: 25 (larva). Short, 1978: 25, 174 (larva).

This species was synonymized with *D. japonica* Cushman by Walkley (1960). The types have been examined as well as other material of the two taxa. In my opinion, the two species are related but distinct. Although *diprionis* shows a great degree of variability, it can be separated from *japonica* by the combination of characters mentioned above.

This species has been reared in North America on a number of hosts, belonging to the genera *Diprion*, *Gilpina* and *Neodiprion*. The variations could not be correlated either with the host associations or with the distribution of the species, and therefore *D. diprionis* is considered to be a polymorphic and widely distributed species in the Nearctic Region. The larval head (fig. 64) is somewhat different from that of *japonica* (fig. 65).

Female: Head wider than long. Face a little convex and punctate. In smaller-sized specimens face with a few longitudinal striations medially. Orbital areas smooth. Clypeus smooth. Malar space 0.6 to 0.7 the basal width of mandible. Frons and vertex smooth. Mesoscutum evenly convex, with minute setiferous punctures. Scutellum also with minute setiferous punctures. Pronotum smooth. Mesopleurum with a few minute and scattered punctures but more shiny than mesoscutum. Metapleurum shiny but with minute and denser punctures, more so than on mesopleurum or mesoscutum. (In specimens from Alaska and British Columbia, the metapleurum is variable from smooth to a little rugulose). Propodeum variable. Areola varying from triangular to wider and more semicircularly arched or crescentic in outline. Costula faint to distinct (even paratypes from same host and locality vary). Propodeum smooth baso-dorsally, somewhat punctate laterally, and petiolar area usually rugulose or with a few rugosities. Second lateral area often depressed and punctate. Propodeum in profile appearing short and abruptly sloping, with dorsal face short, less than half the length of propodeum, and apical slope nearly vertical. Nervellus intercepted at lower 0.3. First tergite rather stocky and thicker medially, with its dorsomedian carinae making an angle of 45° with the horizontal axis. Its lateral carina either interrupted in the region of spiracle, or faded out apically. Area between lateral carina and ventral carinae wider and rough, tending to be rugose. Junction of lateral and median carinae not conspicuously flanged out. Basal declivity of first tergite dull. Central raised area of postpetiole granulose and laterally rugulose. All abdominal tergites coarsely granulose. Ovipositor tip (fig. 38) thicker and with a convex even apical slope. Upper valve a little widened preapically. In profile view ovipositor appears more parallel-sided and without a preapical constriction as seen in *japonica* (fig. 39).

Black. Mandible, malar space, hind corner of pronotum and tegula, yellowish-white. Clypeus brown to black. Legs reddish-brown to yellowish-brown, with hind femur just apically, hind tibia except for an elongate white baso-ventral mark and hind tarsus (except for a white basal mark), black. Fore coxae sometimes brownish. Fore and middle tibia whitish ventrally and faintly blackish dorsally, though often more uniformly brownish. Hind tibia sometimes largely black but always with a yellowish-white basal annulus. Color of tegula variable from yellow to black.

Male: Face and propodeum a little more dull rugulose. Scape and pedicel yellow. Face yellowish white. Malar space yellow and about 0.3 the basal width of mandible. Fore and middle legs yellow with dorsal fuscous marks on femur, tibia and tarsus. Hind trochanters yellow. Hind femur reddish-brown. Rest of coloration and sculpture as in female. Tegula usually yellow.

Variations: The majority of specimens reared from *Diprion*, as well as from *Neodiprion*, show pale yellow tegula and hind tibia white or pale yellow on

the underside, rather than this color confined to base. Usually specimens reared from *Neodiprion* are smaller than those reared from *Diprion*. Specimens from Quebec generally have hind tibia brownish-black except at base.

Specimens from British Columbia, Northwest Territory and Yukon Territory show a tendency of having brownish-black tegula and specimens from Alaska, as well as from British Columbia mountains have a wholly black tegula. Usually all coxae are reddish-brown, but often specimens from Alaska as well as from British Columbia show black or blackish fore coxae and hind tibia and tarsus wholly black or only their bases white.

In smaller-sized specimens reared from *Neodiprion* in Ontario, the costula is absent and propodeum is more shiny, with only a faint depression in the second lateral area. In larger sized specimens from Ontario, reared from *Diprion similis*, the costula is marked by a distinct crease with second lateral area depressed and punctate.

Length: ♀, 4.5-10 mm. Fore wing 4-7 mm. Ovipositor 3-4 mm. ♂, 4-8 mm. Fore wing 3.5-6 mm.

Specimens: Several males and females from the Nearctic Region as follows: *Alaska* (Anchorage, Richardson Highway, at Mi 249, Taku Harbor, Union Bay); *Alberta* (Miette Valley, Jasper Park); *British Columbia* (Awun River, Allard Lake, Clinton, Cottonwood, Goderich, Lac la Hache, Maynard Lake, Revelstoke, Sayward, Victoria, Robson); *California* (Fish Camp, Sherwood, Strawberry); *Connecticut* (New Haven); *Idaho* (Fairfield); *Manitoba* (Aweme, Sand Hills); *New Brunswick* (Fredricton); *New Hampshire* (Mt. Madison); *New Jersey* (Moorestown); *New York* (Watson); *North Carolina* (Clingmans Dome, Mt. Mitchell); *Northwest Territories* (North Shore of Lac Maunoir, Norman Wells, McConnell, Kovaluk River, Raindeer Depot, Tuktoyaktuk); *Nova Scotia* (Liscombe River, Lum Co.); *Ontario* (Biscotasing, Cobden, Constance Bay, Grand Bend, Hawk Lake, Merivale, Oakville, Renfrew, Southampton, Sydney); *Quebec* (Church Cr., Cumshewa Inlet, Brome, Great Whale River, Georgeville, Knob Lake, Laniel, Montreal, Norway Bay); *Washington* (Mt. Rainier, 4700 ft., Snoqualmie Pass); *Wisconsin* (Gibson Lake, Gordon, Polk Co.); *Yukon Territory* (Dempster Highway at mile 37, Herschel Island, White Horse).

Specimens reported by Walkley from Maine, Michigan, Minnesota, Oregon, and Vermont were not seen by me.

Hosts: *Diprion similis*, *Diprion polytomum*, *Gilpina frutetorum*, *G. hercyniae*, *Neodiprion lecontei*, *N. nanulus nanulus*, *N. pratti banksiana*, *N. sertifer*, *N. tsugae*, *N. abietes*.

The larval head is figured in fig. 64.

Distribution: Widespread in northern North America.

10. DELOMERISTA JAPONICA Cushman (figs. 29-33, 39)

Delomerista japonica Cushman, 1937. *Insecta Matsumurana*, 12: 35.

♂, ♀. des. Type ♀, Japan: Nagawa-Mura, Nagano-ken (Washington).

Examined in 1980. Host: *Diprion nipponicus*.

Taxonomy: Walkley, 1960: 367 (in part). Kasparyan, 1977: 73 (in part).

Morphology: Short, 1978: 25, 175 (larva).

This species is extremely similar to *D. diprionis* and the two were considered synonymous by Walkley, and as subspecies by Carlson (1979). The nature of the ovipositor tip (figs. 38, 39) is different in the two: in *japonica* the tip is with an abrupt apical slope and with a preapical constriction. The differences in the two subspecies are rather subtle, but the combination of

characters mentioned in above should distinguish the two, as well as the related *D. indica*. Larval head as in figure 65.

Male and Female: Malar space 0.33 to 0.45 the basal width of mandible. Face a little more strongly arched and punctate than *diprionis* specimens of the same size. Mesoscutum somewhat subpolished, leathery. Mesopleurum and metapleurum smoother and more polished. Propodeal areola more hexagonal in outline. In profile view, propodeum rather evenly convex and with a convex slope. Dorsal face of propodeum about half the length of propodeum, apical slope more inclined rather than vertical. First tergite thinner in depth, with dorsomedian carinae making an angle of 30° with the horizontal axis. Lateral carina complete to apex and area between it and ventral carina narrow and granulate to rugose. Junction of lateral and median carinae conspicuously flanged out. Basal declivity of first tergite smoother and shiny. Central raised area of postpetiole flat and rugulose. Abdomen more rugulose rather than granulate, more often ruguloso-granulate. Ovipositor tip small, tapered, in profile view a little widened preapically (fig. 33), somewhat bulbous and then abruptly sloping to a point. Upper valve with a straight and short slope.

Color essentially similar to that of *D. diprionis*. Fore leg usually yellowish-brown and a little lighter in color than middle and hind legs. Hind femur with only a faint infuscate apical mark. Sometimes tegula and apex of hind femur brownish.

Length: ♀, 8-9 mm. Fore wing 6.5-7 mm. Ovipositor 3.5-4 mm.
♂, 8-9 mm. Fore wing 6.5-7 mm.

Specimens: Japan: Nagawa-Mura, Nagano-ken, ♀ (type) Jan.-March 1937 (Washington). Same locality, ♀, ♂, (Washington). Kamikochi, Japan, ♂, 3♀, July 22 to 23, 1954, Townes family (Townes).

Host: *Diprion nipponicus*.

Distribution: Eastern Palaearctic Region: Japan. Kasparyan (1977) reported it also from USSR.

11. *DELOMERISTA INDICA*, n. sp. (figs. 40-46)

Male and Female: Face a little protuberant medially, punctate. Clypeus flat, subpolished. Malar space 0.5 the basal width of mandible. Frons, vertex, occiput and temple subpolished, shiny, with vertex posteriorly and temple sparsely hairy. Interocellar distance equal to the ocellular distance. Mesoscutum and scutellum mat, evenly convex, with minute setiferous punctures. Side of thorax shiny. Metapleurum with a few distinct scattered punctures and area near hind coxa rugose. Propodeum subpolished, with irregular punctures laterally on pleural areas and scattered rugosities on lateral area and petiolar area. Areola more squarish or triangular, with lateral carinae semi-circularly arched. Costula interrupted, represented by a linear wrinkled line. Propodeum depressed in this area. Nervellus intercepted at the middle, with some specimens showing variations: intercepted a little above or below the middle. Abdomen finely granulate to granuloso-coriaceous; apical margins and terminal tergites mat. First tergite evenly arched (fig. 42), depressed medially, its dorsomedian carinae not very distinct and bordering a shallow basal declivity, which is dull and granuloso-mat. Lateral carina just above spiracle complete, moderately flanged out basally, and area below it rugulose. Central depression on postpetiole granulate, bordered by rugosities (granuloso-rugose). Ovipositor tip evenly tapering and not very bulbous (fig. 44), the upper valve a little heavier near tip and with an even convex slope, as in *D. diprionis*.

Female color: Black. Malar space, mandible except teeth, hind corner

of pronotum, tegula (except for a black apical spot), and wing bases, yellow. Legs reddish-brown with trochanters and stripes on anteroventral aspects of fore and middle femora and ventral region of basal 0.75 of hind tibia, yellow. Apex of hind femur, hind tibia otherwise, and hind tarsus black. Apical tarsal segment of fore and middle legs darker.

Male color: Face, clypeus, mandible except teeth, yellow. Scape and pedicel yellow ventrally. Hind corner of pronotum and tegula yellow. Fore and middle coxae and their trochanters yellow, their tibiae and femora marked with brownish, apical tarsal segments darker. Hind coxa and femur reddish-brown, hind trochanters yellow, hind tibia and tarsi black with tibia ventrally (except at apex) and base of first tarsal segment, yellow.

Length: ♀, 8.5 to 9.5 mm. Fore wing 7.5-8 mm. Ovipositor 3.5-4 mm. ♂, 8-9 mm. Fore wing 7-8 mm.

Holotype: ♀, *India*: Himachal Pradesh: Dhenkund (near Dalhousie), 2743 m, 25-IX-1971, Coll. Gulati. (Gupta).

Allotype: ♂, same data, Coll. Tulsi, DJD-168 (Gupta).

Paratypes: Several ♂, ♀. *India*: Himachal Pradesh (Dalhousie, 2132 m, Dhenkund 2743 m, Ahla 2286 m, Kalatop 2488 m, Khajiar, 1828 m, all localities in Dalhousie Hills, collected from May to October 1971 and July 1965.) (Gupta).

Host: Unknown.

Distribution: *India*: Mountains of Himachal Pradesh.

D. THE MANDIBULARIS GROUP

Basal flagellar segments with fewer to several sensillae (fig. 55-62). Malar space 0.4 to 0.6 the basal width of mandible (except in *laevis*, where it is 1.0 to 1.2). In males malar space 0.33 to 0.4 the basal width of mandible (in *laevis* 0.8). Propodeum convex; in profile view (fig. 50, 54) with basal part convex and apical part abruptly sloping, almost vertically so. Costula faint to indistinct. Propodeum generally granulose to rugulose in pleural area, second lateral area and petiolar area. Often petiolar area with a few wrinkles. First tergite convex, with lateral carina distinct and usually complete. Median carinae usually distinct to the dorsal hump and then weak. Ovipositor stout. Upper valve heavy (figs. 47-49, 51-53) and occupying the greater part of the depth of ovipositor, except in *D. longicauda*, where the tip is narrowed preapically and ovipositor is twice as long as the abdomen. Ridges on lower valve vertical to a little inclined. Basal three ridges strongly inclined. Upper and lower valves of ovipositor meeting in an arched line and in a slant. Ovipositor 0.8 to 1.0 as long as abdomen (2.0 in *longicauda*), usually slightly arched upwards or bent downwards.

This group includes five species: *Delomerista longicauda* (with ovipositor 2.0 the length of abdomen), *D. laevis* (malar space long, 0.8 to 1.2 the mandible width), *D. strandi* (ovipositor very stout and straight), *D. mandibularis* (= *gelida*, ovipositor slightly curved upwards), and *D. masoni* (ovipositor bent downwards and costula strong).

12. DELOMERISTA MANDIBULARIS (Gravenhorst) (figs. 48, 49, 50, 59, 60)

Pimpla mandibularis Gravenhorst, 1829. *Ichneumonologia europaea*, 3: 180. ♀. Lectotype (labelled by Perkins, 1936, designated by Oehlke, 1967). ♀, Poland: Breslau (Wroclaw). Specimens det. Perkins and Kasparyan examined, 1980.

Ephialtes albicinctus Desvignes, 1862. Trans. Ent. Soc. London, 1: 226.

♂. des. Type ♂, ?Great Britain (London). Name preoccupied. Syn. after Fitton (1978). Examined, 1981.

Ephialtes desvignesii Marshall, 1870. Ichneumonidum Britannicorum Catalogus, p. 20. New name for *Ephialtes albicinctus* Desvignes.

Delomerista gelida Walkley, 1960. In Townes and Townes: U. S. Natl. Mus., Bull. 216(2): 366. ♀. des. fig. Type ♀, N.W.T.: Cameron Bay, Great Bear Lake (Washington). Examined, 1980. New synonym.

Paratypes from Sask: Waskesiu, Quebec: Great Whale River.

Taxonomy: Oehlke, 1967: 34. Aubert, 1969: 99. Fitton, 1976: 326. Fitton, 1978: 14. Kasparyan, 1977: 74.

The lectotype locality mentioned by Oehlke (1967), who designated the lectotype, is Breslau (=Wroclaw), while Kasparyan mentions Warmbrunn as the lectotype locality. Gravenhorst had specimens from both the localities. The type of *Ephialtes albicinctus* Desv. has a label by Perkins (1933) mentioning its synonymy with *D. mandibularis* Grav. This synonymy was never published by him. Fitton (1978) first published this synonymy.

Female: First and second flagellar segments with few sensillae (fig. 59, 60). Face convex medially and with scattered punctures on a shiny surface. Sometimes punctures a little denser. Clypeus smooth and flat. Malar space 0.5 the basal width of mandible. Mesoscutum subpolished with setiferous punctures. Side of thorax polished and with minute scattered setiferous punctures. Propodeum smooth dorsally and rugulose laterally and in the petiolar area. Second lateral area depressed and rough. Areola smooth, horse-shoe shaped, sometimes a little squarish or pentagonal. Costula faintly indicated by a broken carina. Seen in profile, propodeum with a convex slope (fig. 50). Nervellus intercepted below the middle. Abdomen including median area of postpetiole granulose. First tergite as in fig. 50, with dorsal and lateral carinae distinct and ruguloso-coriaceous on side. Ovipositor stout, of uniform width, and preapically slightly curved upwards, as long as abdomen. Ovipositor tip a little widened (fig. 48, 49), with dorsal valve occupying nearly 2/3 of the depth of ovipositor near apex, while the lower valve occupying 2/3 of the depth of ovipositor near base (the two valves meeting in a slant).

Black. Malar space, mandible, and hind corner of pronotum, yellowish-white. Tegula black, though often narrowly to partly yellowish-white. Legs dark reddish-brown to orange-brown, with fore leg partly to largely brownish in American populations. Hind tibia and tarsus black. Apex of hind femur often black. Middle tibia and tarsus reddish-brown to blackish-brown. Fore coxa brownish-black in Swedish specimens also.

Male: Face yellowish-white, smoother or a little rugulose in larger specimens. Malar space yellow, 0.3 to 0.4 the basal width of mandible. Scape and pedicel yellow ventrally, or black. Propodeal carinae strong. Costula faint to obsolete. Areola elongate. Tegula yellow. Fore and middle legs largely pale yellow, with their femora and tibiae and tarsi brownish dorsally. Hind coxa, trochanter and femur reddish-brown. Trochanters often yellow ventrally. Hind femur sometimes apically black marked. Hind tibia and tarsus blackish-brown dorsally, with tibia ventrally largely yellowish-white in the middle. Postpetiole rugose. Abdominal tergites granuloso-mat.

Length: ♀, 8.5 to 9.5 mm. Fore wing 7-8 mm. Ovipositor 6.5-7.5 mm. ♂, 6-9 mm. Fore wing 5-8 mm.

Specimens examined: 1♂, ?England, type of *E. albicinctus* (London).

England: Newton Abbot, ♀, 8-VI-1941, as *mandibularis* by Perkins, J. F. Perkins (Washington). Russia, ♂, ♀, from *Betula*, 18-V-1890 (det. as *mandibularis* by Kasparyan) (Townes). Germany: Siegmundung, ♀, 7-VI-1919 (det.

as *mandibularis* by Habermehl) (Ottawa). *Northwest Territories*: Cameron Bay, Great Bear Lake, ♀ (type of *D. gelida* Walkley), 1-VII-1957, T. N. Freeman (Washington). *Quebec*: Great Whale River, ♀, 20-VII-1949 (paratype of *D. gelida*) (Ottawa). *Saskatchewan*: Waskesiu, ♂, ♀, 20-VI-1938, J. G. Rempel (♀ paratype of *gelida*) (Townes). In addition 28♂ and 22♀ from the following localities: *British Columbia* (Hixon, Ft. Nelson, Racing River, Stone Mt. Park); *Alaska* (Anchorage, Delta Junction, Tsaina River); *Quebec* (Great Whale River), *Saskatchewan* (Conquest); *Northwest Territories* (Normal Well, Kovaluk River, Tuktoyaktuk), *Yukon Territory* (Dawson), and *Sweden* (Messau, Skåne).

Only males from the following states: Arizona (near Alpine), Alberta (Banff), California (Leevining), where they occur sympatrically with *D. masoni* or *D. townesorum*. The males show variations and their identities are not very clear.

In addition, Walkley also reported this species from Ontario, Colorado, New York and Pennsylvania. Those specimens were not examined.

Hosts: *Euura amerinae* and *Strongylogaster* sp. (Tenthredinidae) in Europe.

Distribution: Holarctic. In the Nearctic Region apparently restricted to Northern and Northwestern parts.

13. DELOMERISTA STRANDI (Ulbricht) (figs. 47, 54, 57, 58)

Pimpla strandi Ulbricht, 1911. Arch. Naturgesch., 77: 149. ♀.

Lectotype (designated by Oehlke, 1967), ♀, "Norvegia, E., Coll. Strand, Rosvana" (Berlin). Examined in 1980.

Delomerista strandi: Oehlke, 1967. Hymenopterorum Catalogus (nova editio), 2: 34. Kasparyan, 1977: 74. Russia.

Female: Face centrally a little rugulose and punctate. Malar space 0.5 to 0.6 the basal width of mandible. Basal flagellar segments with fewer hairs and with several sensillae (figs. 57, 58). Frons, vertex and temple smoother. Thorax dull, hairy. Mesoscutum with close setiferous punctures, particularly on the middle lobe. Mesopleurum with scattered punctures, smoother in smaller-sized specimens. Metapleurum partly to largely rugulose. Pleural area of propodeum rugulose. Second lateral area rugulose and depressed. Rest of propodeum smoother but with a few wrinkles around carinae. Areola elongate, somewhat pentagonal in outline. Costula incomplete. In profile, propodeum as in fig. 54. First tergite strongly convex (fig. 54), rugulose to rugose laterally, its median carinae weak beyond the dorsal hump. Its lateral carina strong throughout. Abdomen finely granulose. Ovipositor stout, straight and compressed, its upper valve very wide (fig. 47), and occupying almost 2/3 the apical depth of ovipositor. Ovipositor narrow basally and widened apically (1:1.5), the line of junction of the upper and lower valves running obliquely from base to apex of ovipositor. Teeth on lower valve vertical, with basal 3-4 teeth inclined. Ovipositor about 0.8 as long as abdomen.

Black. Malar space and mandible yellow. Tegula black. Legs reddish-brown with hind tibia and tarsus black. Fore and middle tarsi brownish-black. Middle tibia fuscous dorsally (legs in type-specimen from Europe a little paler). Fore coxa and trochanter brownish in the lectotype and in a few American specimens). Clypeus brown. Sometimes mandible brown rather than yellow. Hind tibia varying from pale brown to blackish brown. Wings with a purple iridescence in specimens from Mackenzie River Delta, which are also larger and stouter specimens.

Male: Unknown.

Length: ♀, 7-11 mm. Fore wing 5-8 mm. Ovipositor 4-6 mm.

The lectotype, which is a smaller-sized specimen, has the face smoother, dull and not distinctly punctate. Otherwise similar to other specimens.

Specimens: 'Norvegia, E. Ros Vania', Coll. Strand. ♀ (lectotype) (Berlin) (A cotype of this species is actually a specimen of *D. laevis* Gravenhorst). *Alaska*: mile 28, Richardson Highway, ♀, (det. *D. gelida* by Walkley), 27-VII-1951, W. R. M. Mason (Ottawa). *British Columbia*: Stone Mt. Park, 3800± ft., ♀, 13-VII-1973, H. & M. Townes (Townes). *Alberta*: Jasper, ♀, 26-VII-1949, C. P. Alexander (Townes). This specimen has longer (0.8) malar space). *Northwest Territories*: Mackenzie River Delta, 68° 43' N., 134° 15' W., 3♀, 18 to 29-VII-1979, L. Humble (Ottawa) (det. as *D. borealis* in 1980). Norman Wells, ♀, 29-VI-1969, S. E. Shewell (Ottawa). *Yukon Territory*: mile 87 on Dempster Highway, ♀, 18 to 28-VII-1971, G. & D. M. Wood (Ottawa).

Host: Unknown.

Distribution: Holarctic Region. In the Nearctic Region, apparently confined to the Northwestern parts.

14. *DELOMERISTA MASONI*, n. sp.

This species has apparently been confused with *Delomerista gelida* = *mandibularis* in the past, as some specimens from Alaska and British Columbia, in Canadian National Collection, Ottawa bear determination label of *D. gelida* Walkley. It can be readily separated from *gelida* = *mandibularis* by the nature of the ovipositor, tegula, propodeum, etc.

Female: Head wide, punctate. Eye moderately deeply notched. Malar space 0.4 to 0.5 the basal width of mandible. Basal flagellar segments with sensillae. Mesoscutum subpolished, with numerous setiferous punctures. Side of thorax polished and with minute setiferous punctures on mesopleurum and metapleurum; those on metapleurum a little coarser than on mesopleurum. Pleural area of propodeum irregularly punctate. Propodeum dorsally smoother and shiny. Areola semicircularly rounded. Costula strong and distinct. All propodeal carinae strong. Petiolar area subpolished with weak rugulosity around carinae. Nervellus intercepted in lower 0.3. First tergite short, humped dorsally, where median carinae angled and getting weaker. Lateral carina distinct throughout. Abdomen granulose, with postpetiole laterally and basomedian area of second tergite rugose. Ovipositor 0.8 the length of abdomen, widened apically from base, with a weak median bend.

Black. Malar space, mandible, hind corner of pronotum, and tegula yellowish-white. Antenna and clypeus brownish. Legs reddish-brown, with hind tibia and tarsus largely black. Hind tibia with a basal and ventral yellow mark. Hind tarsus with a basal yellow ring. Fore femur and tibia and middle tibia yellowish ventrally.

Male: Scape and pedicel ventrally yellowish-white. Flagellum brown. Face, clypeus, mandible and malar space yellowish-white. Fore and middle legs and hind trochanters, tegula, and hind corner of pronotum yellowish-white. Hind coxa and femur yellowish-brown. Apex of hind femur narrowly black, or hind femur wholly yellowish-brown. Hind tibia and tarsus with black marks and yellow ventrally. Malar space 0.3 the basal width of mandible. Nervellus intercepted at lower 0.4 to upper 0.4. Dorsal carina of first tergite usually strong to apex of tergite. Costula present. Propodeal carinae like those in female.

Variations: This species is rather close to *D. strandi* from the northern latitudes and some specimens of it approach that species. The chief differences being its yellow tegula, hind tibia not wholly black, costula of propodeum strong

and complete and propodeum dorsally smoother. However, there are some specimens where the costula appears a little weak, but complete, second lateral area rugulose, hind leg more extensively black, and tegula may have a black spot. In these specimens, generally, the apex of hind femur is also black or blackish, which is not the case in *strandii*, and usually there is a basal yellow ring on hind tarsus and tibia. The shape of areola is also variable, being a little elongate and not semicircular in some specimens.

Length: ♀, 9-11 mm. Fore wing 5.5-8.5 mm. Ovipositor 4 -5.5 mm. ♂, 9-10 mm. Fore wing 6-8 mm.

Holotype: ♀, Michigan: Ann Arbor, 30-V-1962, H. & M. Townes (Townes).

Paratypes: New York: Ithaca, 1♀, 3-V-1936, H. K. Townes. Pennsylvania: Spring Brook, ♀, 8-VI-1945, H. & K. Townes. Nebraska: Valentine Refuge, 2♂, 2♀, 7-VI-1972, H. & M. Townes (Townes). Ontario: Chaffeys Locks, ♀ (face narrower), 21-VI-1975, J. Belwood (Townes). Ottawa, ♀, (det. *gelida* by Walkley), 29-V-1941, G. S. Walley. Oregon: Pinehurst, ♀, 2-VII-1978. H. & M. Townes (Townes). 7♂ from Ochoco Creek, Hyatt Reservoir, Mt. Hood, June-July 1978, H. & M. Townes (Townes). Colorado: Gould, 1♂, 6-VIII-1974, H. & M. Townes. Arizona: 15♂, near Alpine, Oak Cr. Canyon. (Townes).

Distribution: Nearctic Region, New York to Rocky Mountains.

15. DELOMERISTA LAEVIS (Gravenhorst) (figs. 52, 61, 62)

Pimpla laevis Gravenhorst, 1829. Ichneumonologia europeaea, 3: 180.

♀. Type ♀, Piemont, Italy (Wroclaw).

Pimpla texana Cresson, 1870. Trans. Amer. Ent. Soc., 3: 145. ♀.

Type ♀, Texas (Philadelphia). Homotype examined in Townes Collection, 1980. Synonymized by Oehlke, 1966.

Pimpla laevifrons Thomson, 1877. Opusc. Ent., 8: 750. ♂, ♀.

Lectotype (labelled by Aubert, 1968) ♀, 'Norl' (Lund). Synonymized with *texana* by Townes, 1944.

Taxonomy: Walkley, 1960: 365. Oehlke, 1966: 816. Aubert, 1979: 73.

This species is rather characteristic in having a smooth face, convex clypeus, convex temple and malar space about as long or longer than the basal width of mandible. The ovipositor tip (fig. 52) assigns it to the Mandibularis Group.

Female: Basal two flagellar segments hairy and with very few sensillae. Head a little narrowed ventrally. Malar space 1.0 to 1.2 as long as the basal width of mandible, longest among the species of *Delomerista*. Clypeus basally convex, smooth. Face smooth, subpolished, with a few minute scattered punctures. Frons, vertex and temple smooth. Temple slightly more convex and wider than in other species. Thorax subpolished. Mesopleurum smoother than in other species, with only minute scattered punctures. Metapleurum finely granular, at least on apical half. Propodeum granulose in pleural area, second lateral area, and in petiolar area. Areola elongate, roughly triangular, narrowed and rounded basally. Costula faintly indicated or partly indistinct. Nervellus intercepted at lower 0.33 to 0.5. First tergite angled dorsally, where median carinae almost end. Lateral carina more or less complete. Postpetiole laterally granuloso-rugose. Abdomen finely granular with apical tergites becoming shagreened or coriaceous. Ovipositor stout, short, 0.7 to 0.8 the length of abdomen, tip heavy, thick, (fig. 52).

Black. Malar space and mandible pale yellow. Clypeus brownish. Tegula black, sometimes partly yellow. Legs reddish-brown with apices of hind femur

and tibia and all tarsi fuscous to black. Color of hind tibia varying from wholly black to wholly reddish-brown (particularly in European specimens). Wings lightly clouded (European specimens) or darker fuscous (American specimens). Apical fuscous marks on hind femur often light to absent.

Male: Face black with whitish marks on sides (face of males of other species wholly yellowish-white). Clypeus yellowish-white. Coxae black. Trochanters fuscous. Propodeum wholly granulose. Costula usually distinct. Abdomen more shagreened and coriaceous than granulose.

Length: ♀, 7.5 to 10.5 mm. Fore wing 6.0-9.0 mm. Ovipositor 5.0-6.0 mm. ♂, 5.5-9.5 mm. Fore wing 4.5-8.0 mm.

Specimens: *Europe*: "Norvegia E., Hemnesberget Ranen", 1♀ (cotype of *D. strandi*), 13-VII-1903, Coll. Strand (Berlin). Several males and females from Alaska, British Columbia, Manitoba, Maine, New Hampshire, Quebec, Northwest Territory, and Yukon Territory.

Host: Aubert (1969) mentions *Rhyacionia buoliana* as a host.

Distribution: Europe.

16. DELOMERISTA LONGICAUDA Kasparyan

This species is characterized by having a very long ovipositor, which is about 2.0 as long as abdomen and longer than the body length. The ovipositor tip is also characteristic (fig. 53). The ovipositor tip places it under the Mandibularis Group.

Female: First flagellar segment with few sensillae (fig. 55). Face wider than long, smooth, subpolished, with a few indistinct scattered punctures. Malar space $0.5 \pm$ the basal width of mandible. Clypeus flat, smooth. Frons, vertex and temple smooth. Thorax subpolished. Mesoscutum more hairy than mesopleurum and metapleurum, which are beset with scattered setiferous punctures. Propodeum subpolished, finely rugulose apicolaterally, or largely smooth and shiny. Pleural area of propodeum rugulose. Areola horse-shoe shaped, often open basally or apically, smooth. Costula indistinct. Second lateral area of propodeum a little depressed, smooth to somewhat wrinkled. Petiolar area smooth or with a few wrinkles. Nervellus intercepted at lower 0.3. First tergite 1.5 to 1.75 as long as wide, evenly convex dorsally, finely granuloso-rugulose to shagreened, its lateral carina weak, but distinct beyond the spiracle, its median carinae weak. Second and third tergites shagreened to granulose. Apical tergites shagreened to coriaceous. Ovipositor long, about 2.0 as long as abdomen, and longer than the body, curved upwards, more so in apical 0.2. Its tip demarcated by a shallow constriction (fig. 53), swollen preapically, with upper valve wider and with a long apical slope.

Two subspecies are recognized: *Delomerista longicauda longicauda* Kasparyan from USSR and *D. longicauda americana* from North America. The two differ mainly in coloration of legs and tegula, and also show minor differences in the sculpture of propodeum and abdomen.

Key to the subspecies of *Delomerista longicauda*

1. Tegula black. Legs including hind femur, yellowish-brown. Hind tibia and tarsus fuscous. Propodeum subpolished and finely rugulose in petiolar and second lateral area. Basal three abdominal tergites granulose. USSR. . . . 16a. *longicauda longicauda* Kasparyan (p. 30)

Tegula yellow. Legs yellowish-brown but fore leg brownish-black. Middle and hind legs beyond trochanters blackish-brown (blackish marks on middle and hind femur varying in extent). Propodeum shiny with second lateral area and petiolar area largely smooth. Basal three abdominal tergites finely ruguloso-granulose, leaning toward shagreened. North America. . . . 16b. longicauda americana, n. subsp. (p. 30)

16a. DELOMERISTA LONGICAUDA LONGICAUDA Kasparyan

Delomerista longicauda Kasparyan, 1973. Zool. J., 52: 1877. ♀. des. fig. Type ♀, Russia (Leningrad). Paratype examined, 1980. Taxonomy: Kasparyan, 1977: 72.

Female: A paratype from Russia has been examined and the chief diagnostic features are given in the key to subspecies. The first tergite is stocky and its lateral carina is indistinct in the specimen before me.

Distribution: Russia.

16b. DELOMERISTA LONGICAUDA AMERICANA, n. subsp. (figs. 53, 55, 56)

Female: Characterised as in the key. Black. Malar space, mandible, hind corner of pronotum, and tegula, whitish-yellow. Fore leg brownish-black with yellow marks on underside of femur, tibia, and trochanters. Middle coxa and trochanters yellowish-brown. Middle femur, tibia and tarsus fuscous. Tibia often yellowish marked. Hind coxa, trochanters, and base of femur yellowish-brown. Femur otherwise, tibia and tarsus blackish-brown. Base of tibia and tarsus yellowish-white.

Male: Face white, about 1.5 as wide as long, shiny, with minute punctures. Malar space black, 0.33 the basal width of mandible. Scape and pedicel black. Propodeum subpolished, finely rugulose around carinae. Abdomen mat to shagreened. Postpetiole with a median depression. Median carinae on first tergite indistinct. Fore coxa white. Middle and hind coxae brownish. Fore and middle femora, tibiae and tarsi fuscous marked, with a white base color. Hind femur usually largely black or blackish, though the extent variable. Hind tibia black with a ventral white mark. Hind tarsus black.

Length: ♀, 8-10 mm. Fore wing 6.5-9 mm. Ovipositor 8-11 mm. ♂, 7-8 mm. Fore wing 6-7 mm.

Holotype ♀, *Alaska*: Anchorage, 6 to 12-VII-1976, Peter A. Rush (Townes).

Paratypes: *Alaska*: Anchorage, ♀, 25 to 30-VI-1976; ♂, 11 to 18-VI-1976, Peter A. Rush (Townes). Tsaina River, ♀, 18-VIII-1973, H. & M. Townes (Townes). *British Columbia*: Stone Mt. Park at 3800± and 5500 ft., 3♀, 10♂, 13 to 20-VII-1973, H. & M. Townes (Townes).

Host: Unknown.

Distribution: Alaska and British Columbia in Northwestern Nearctic Region.

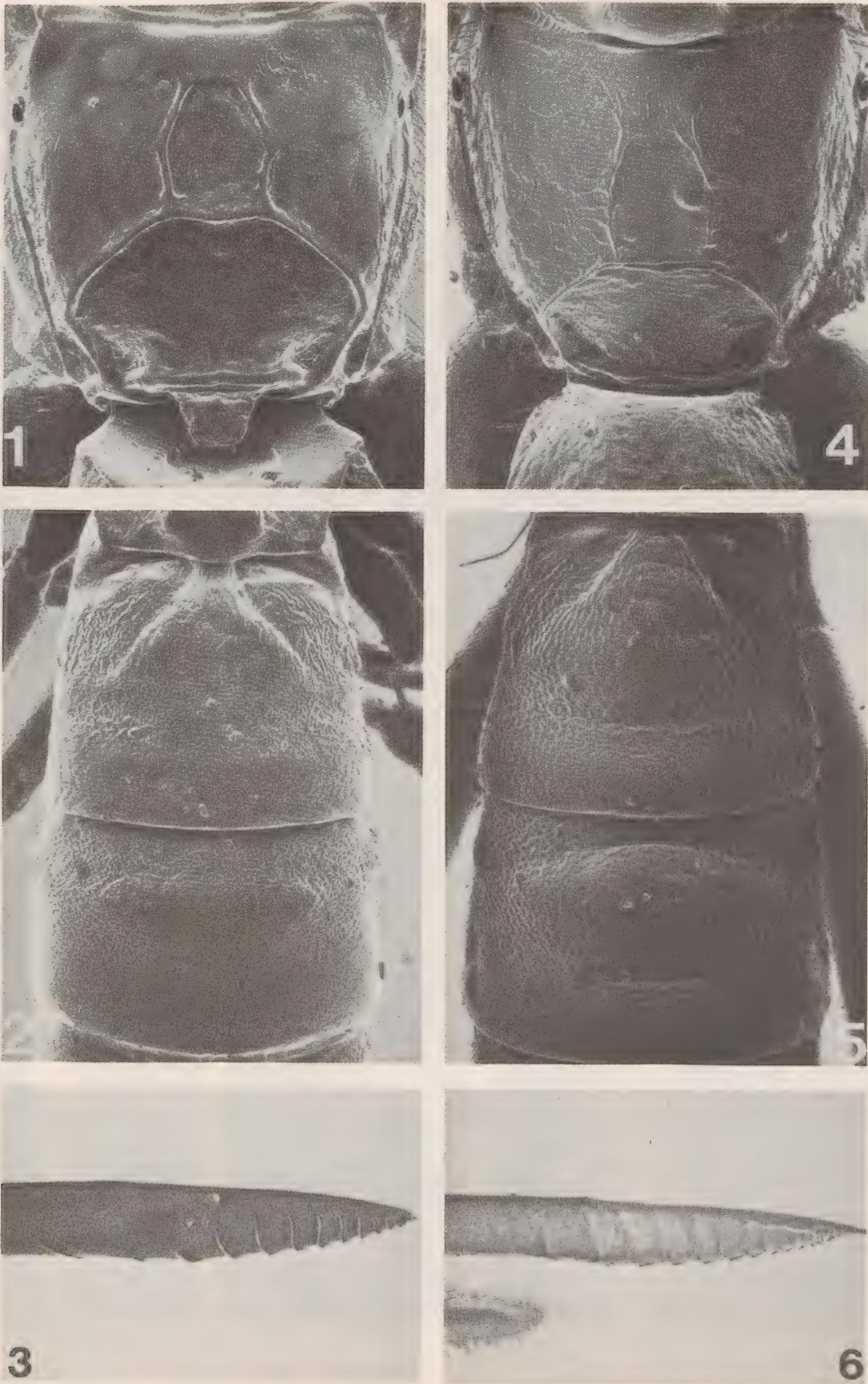
ACKNOWLEDGMENT

I am thankful to Dr. Henry Townes for providing me with the necessary facilities to undertake this work and for his advice.

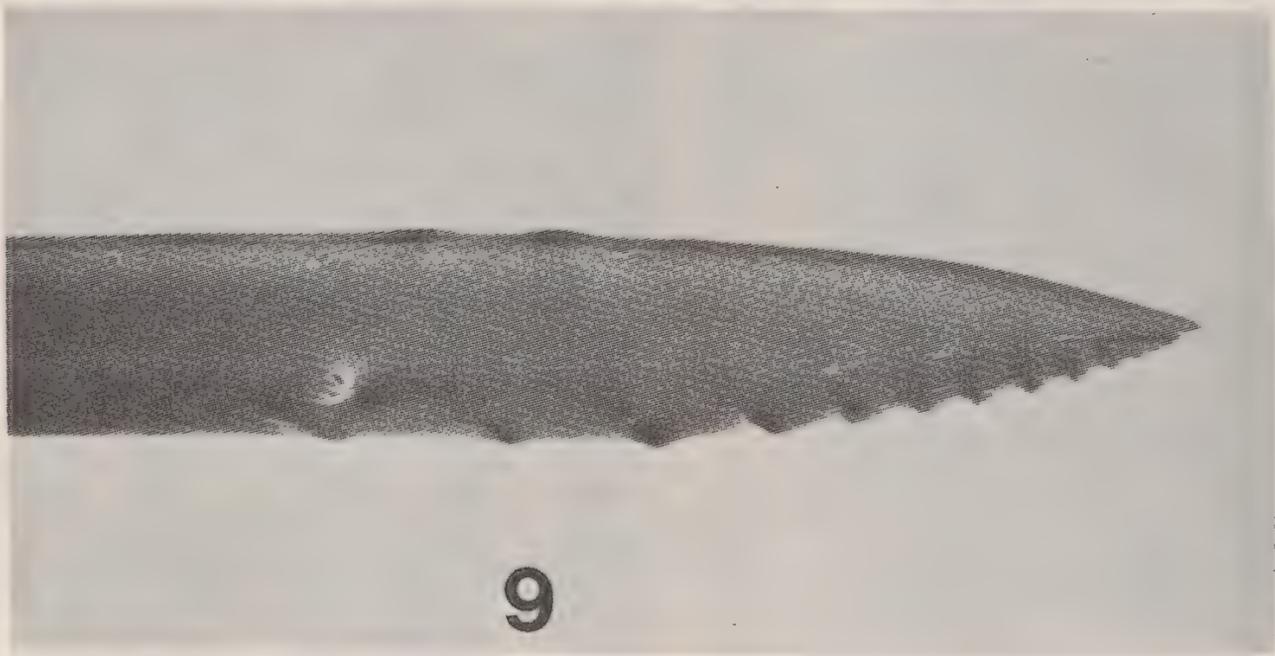
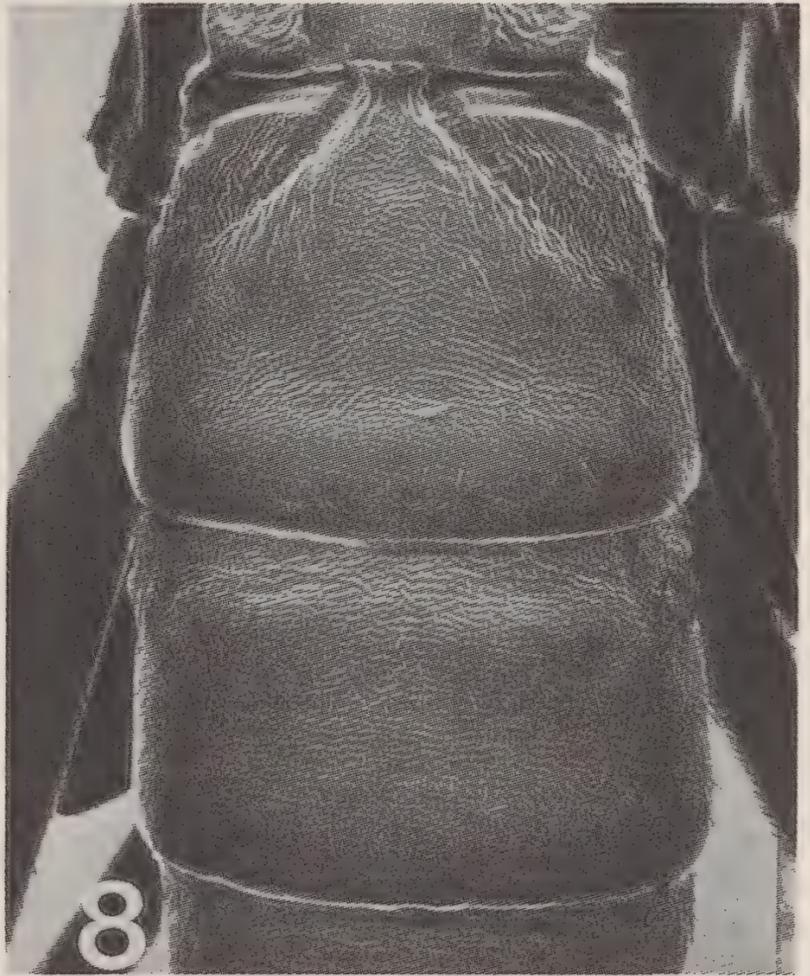
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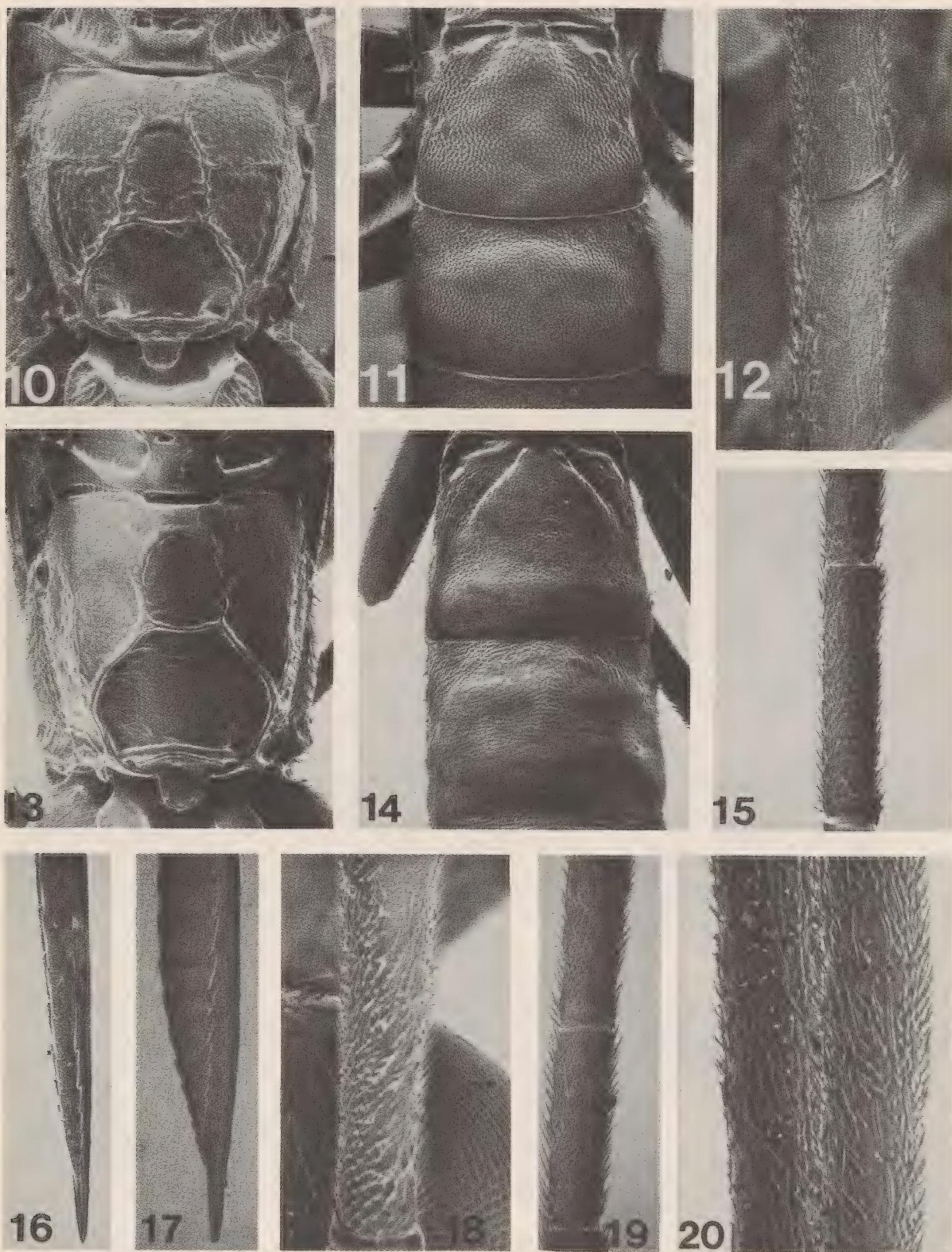
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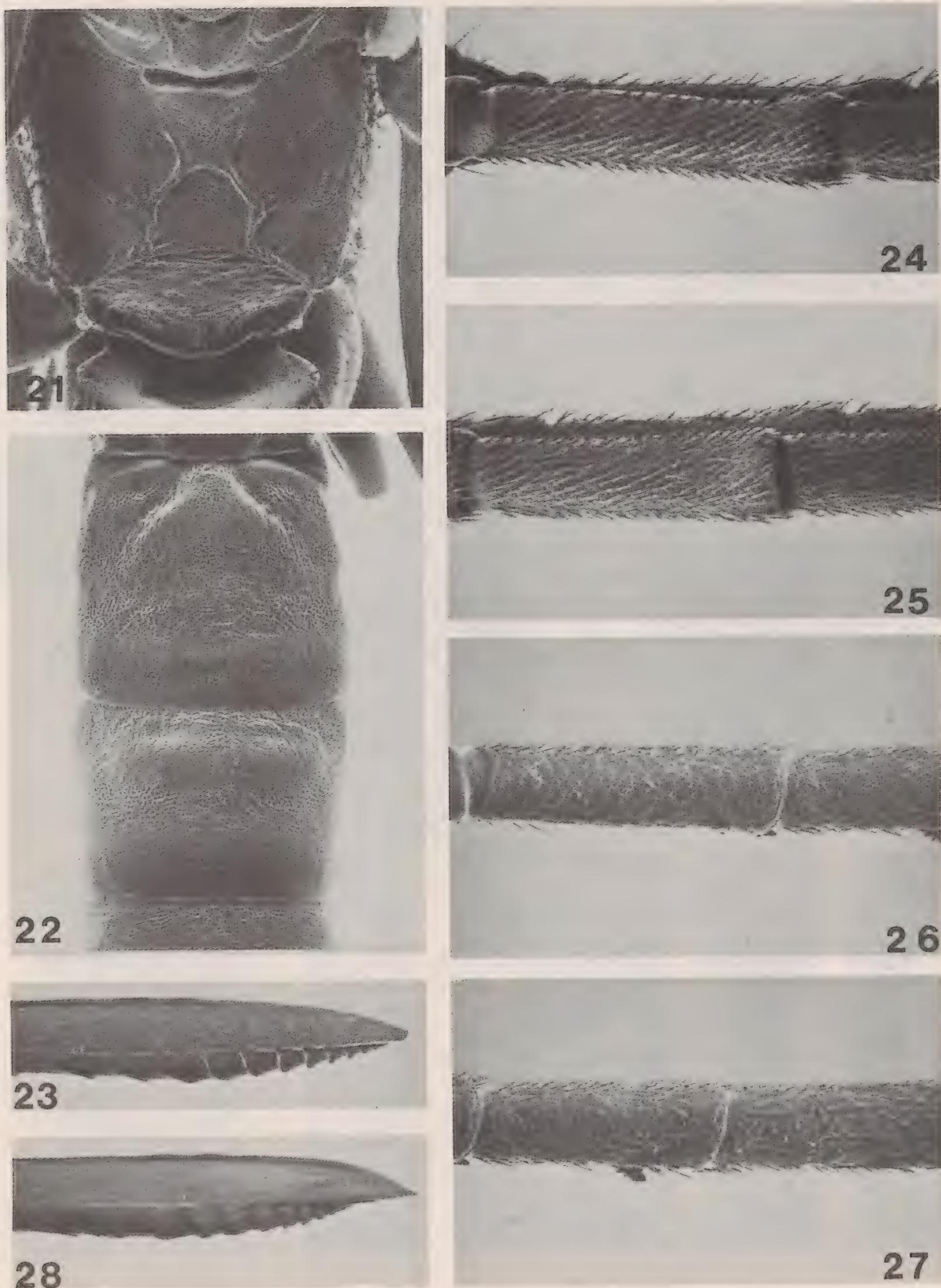
Figs. 1-3. *Delomerista novita*: 1, Propodeum. 2, Tergites II, III. 3, Ovipositor tip. Figs. 4-6. *D. pfankuchi*: 4, Propodeum. 5, Tergites II, III. 6, Ovipositor tip.



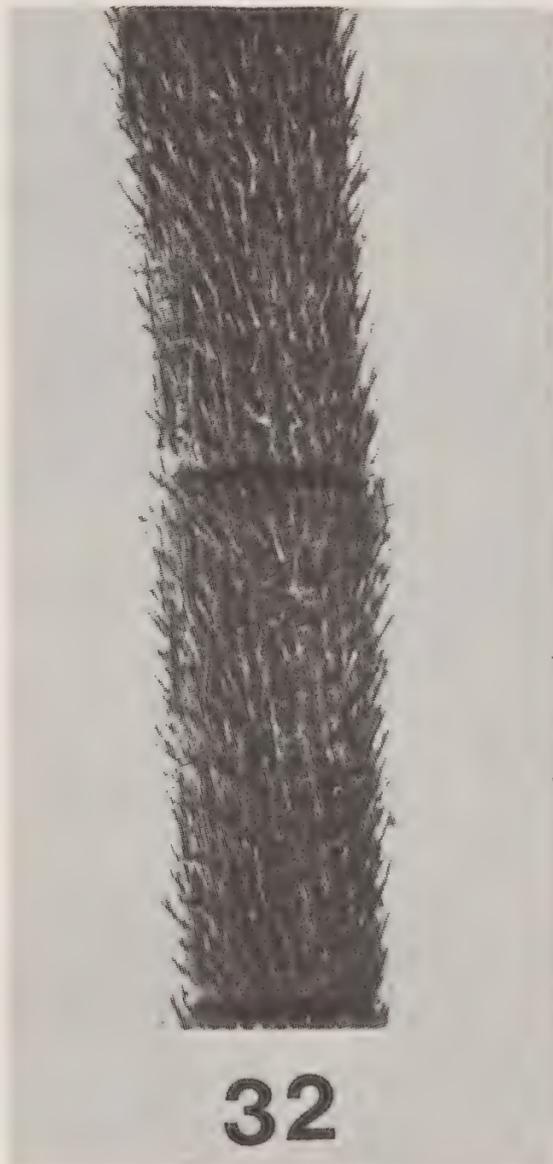
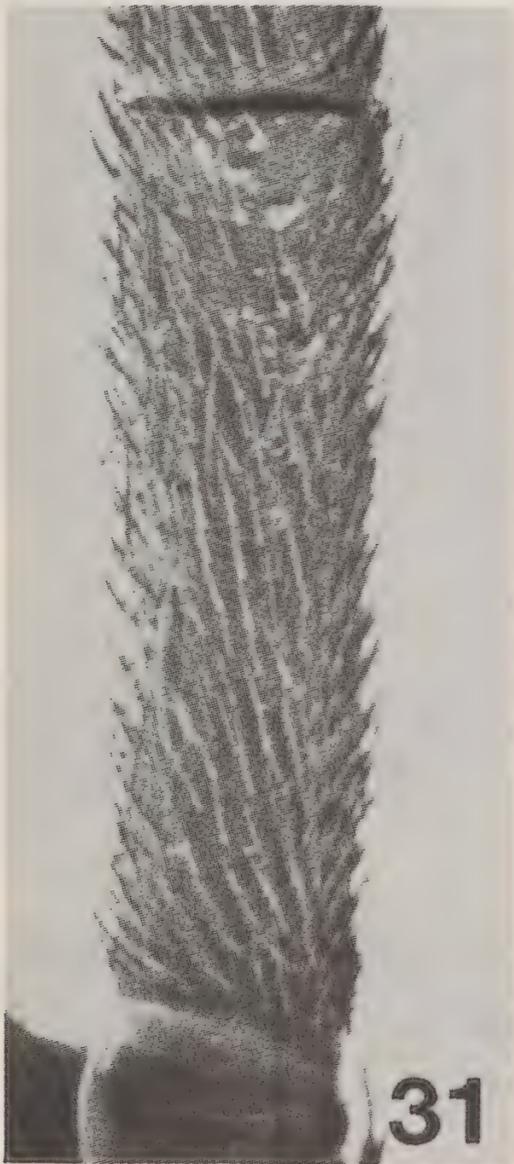
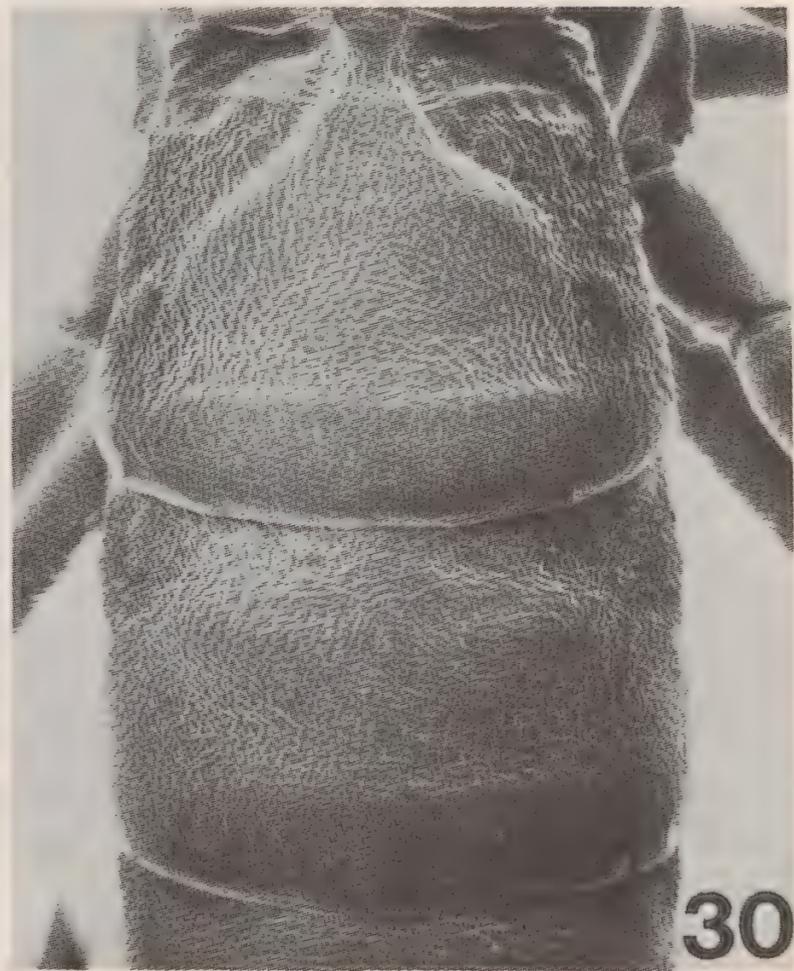
Figs. 7-9. *Delomerista borealis*: 7, Propodeum. 8, Tergites II, III. 9, Ovipositor tip.



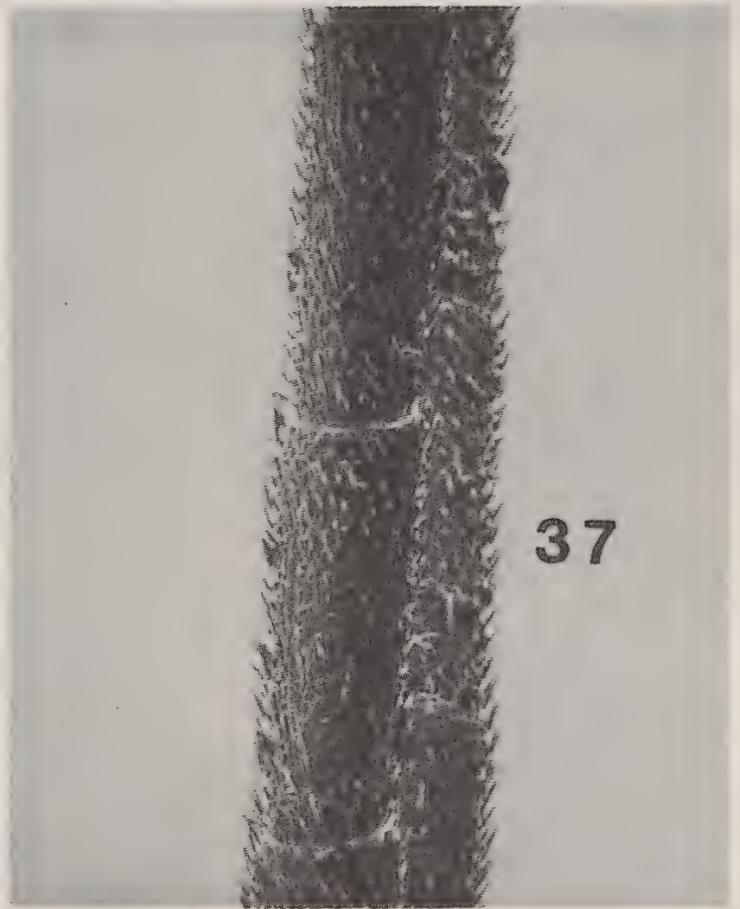
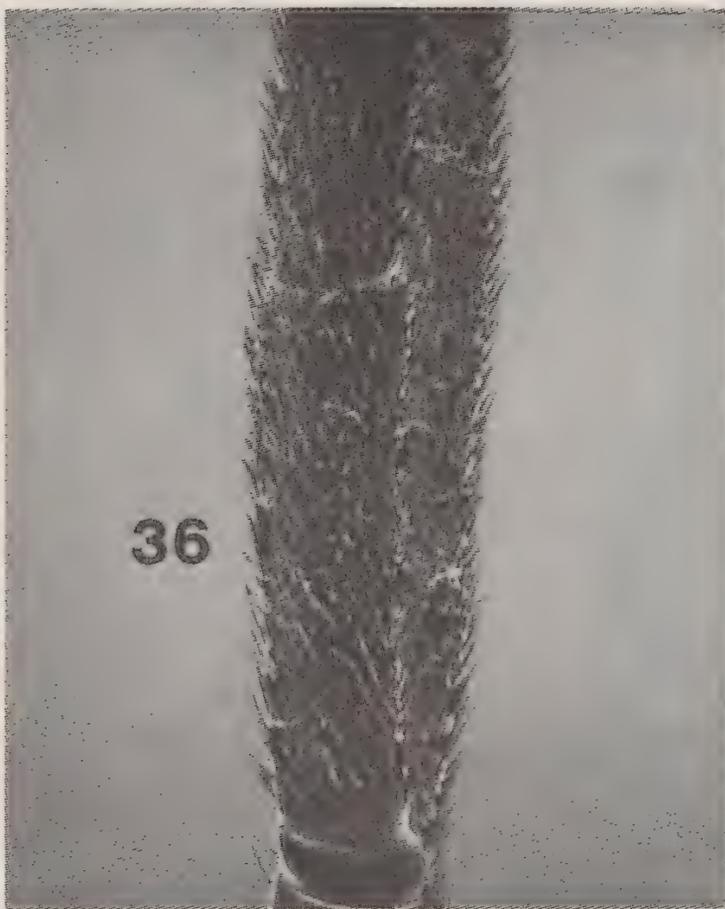
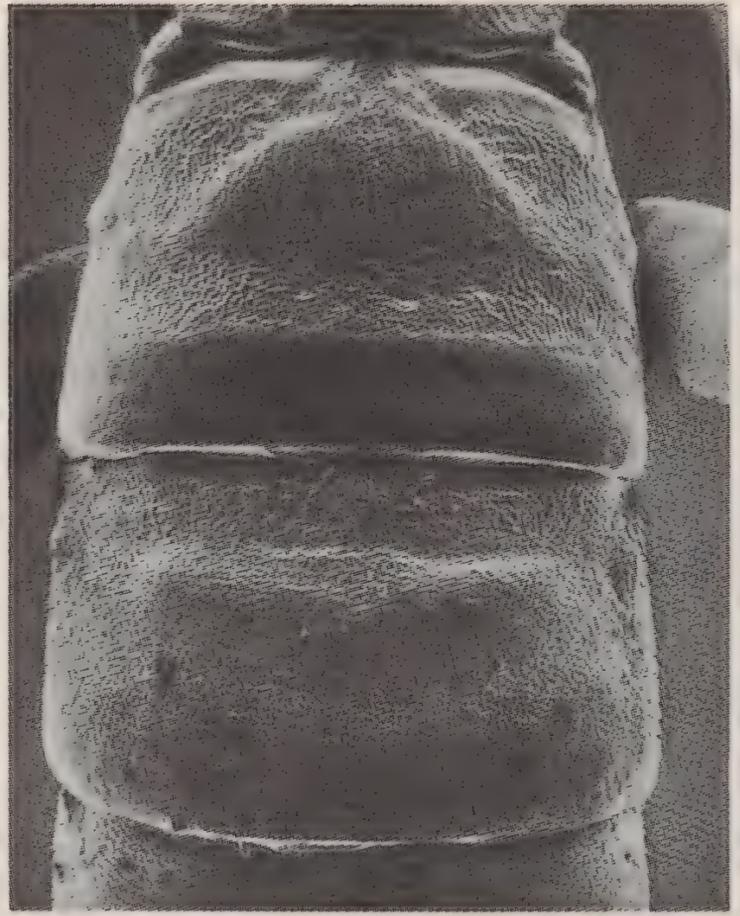
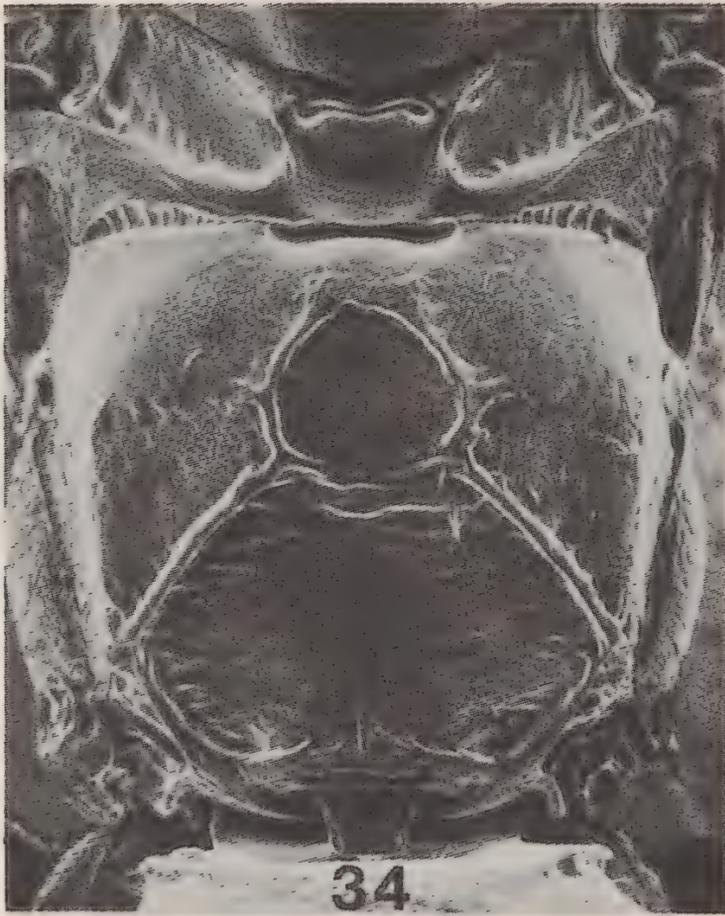
Figs. 10-20. *Delomerista kusuoi*: 10, Propodeum. 11, Tergites II, III. 12, Flagellar segments II, III. 17, Ovipositor tip. 18, Flagellar segment I. *D. lepteces*: 13, Propodeum. 14, Tergites II, III. 15, Flagellar segment I. 16, Ovipositor tip. 19, Flagellar segments II, III. *D. pfankuchi*: 20, Flagellar segment I.



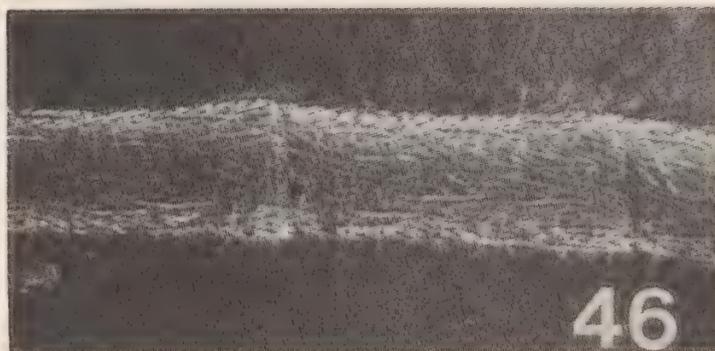
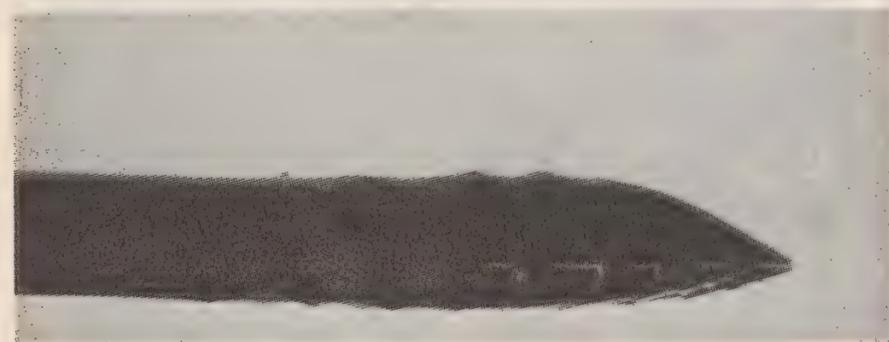
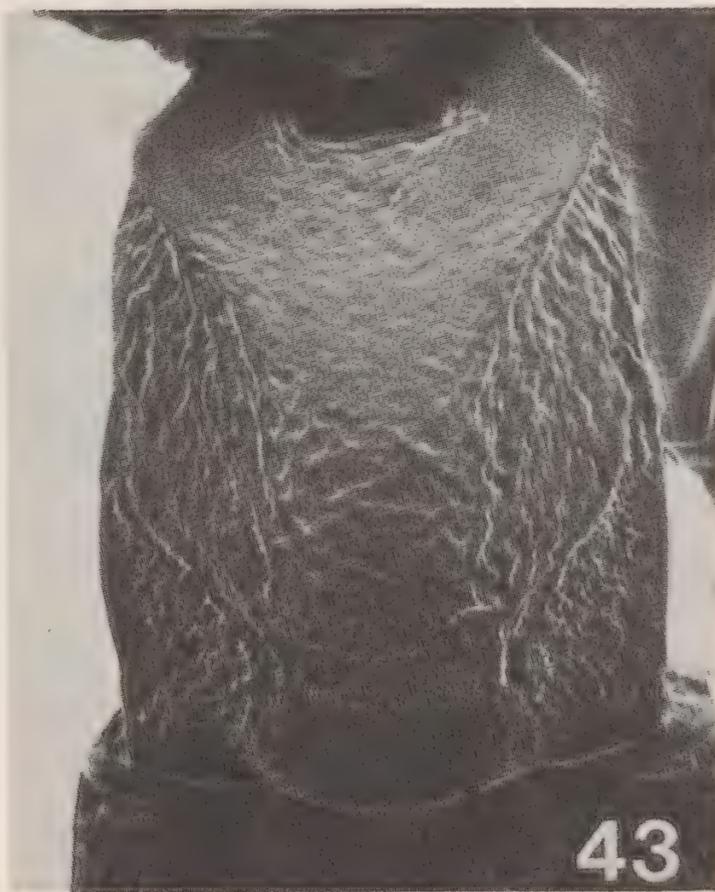
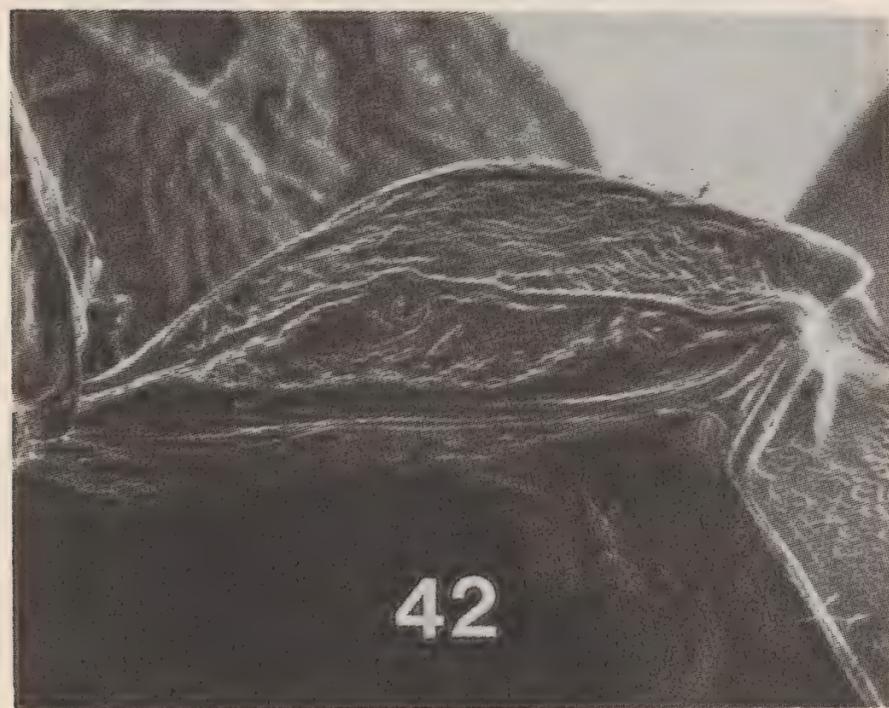
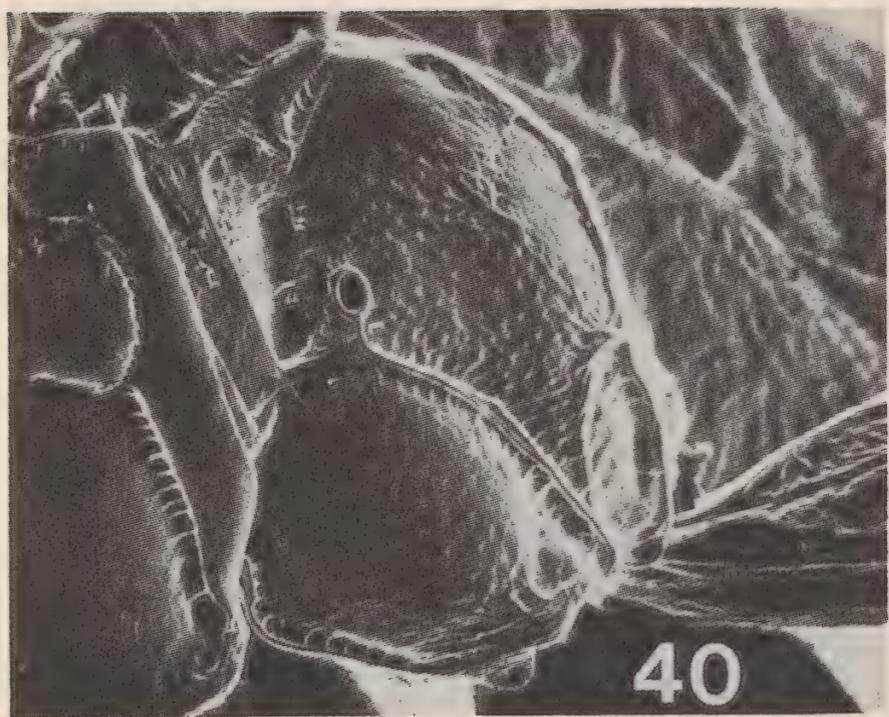
Figs. 21-25. *Delomerista walkleyae*: 21, Propodeum. 22, Tergites II, III. 23, Ovipositor tip. 24, Flagellar segment I. 25, Flagellar segments II, III. Figs. 26-28. *D. townesorum*: 26, Flagellar segment I. 27, Flagellar segments II, III. 28. Ovipositor tip.



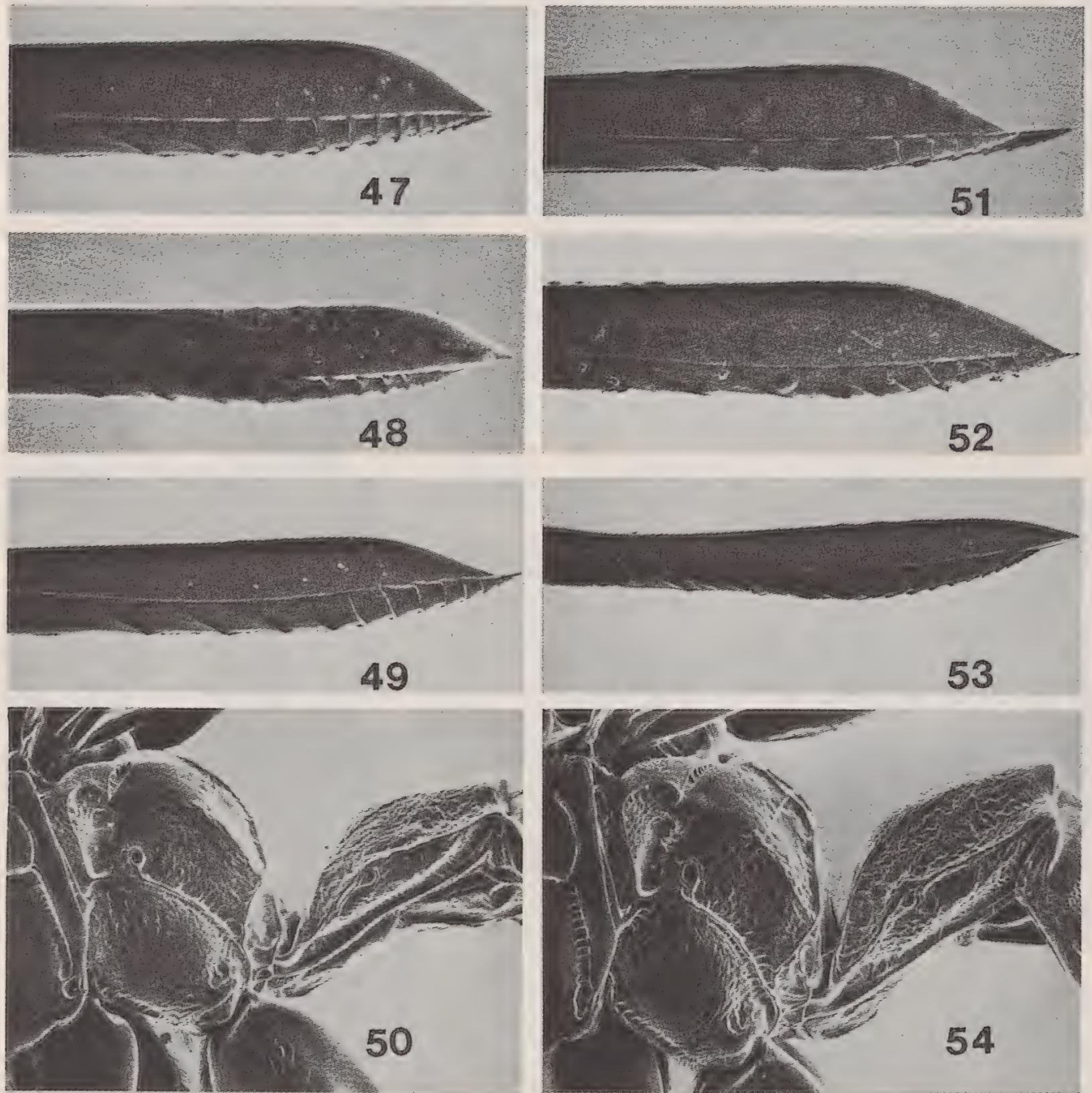
Figs. 29-33. *Delomerista japonica*: 29, Propodeum. 30, Tergites II, III. 31, Flagellar segment I. 32, Flagellar segments II, III. 33, Ovipositor tip.



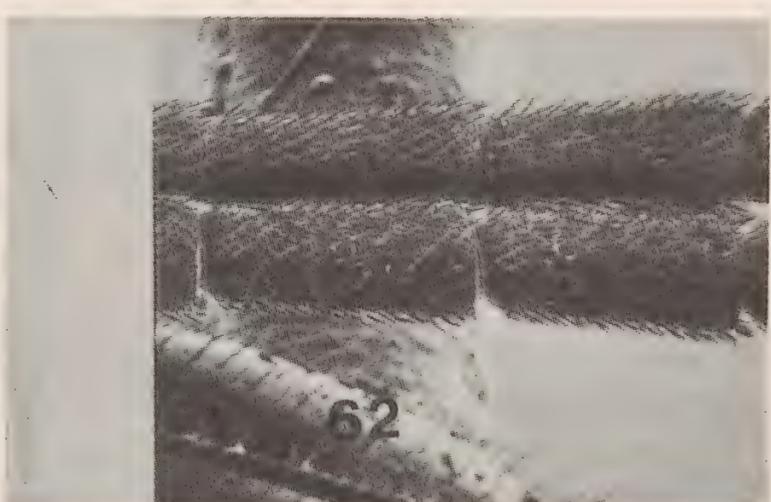
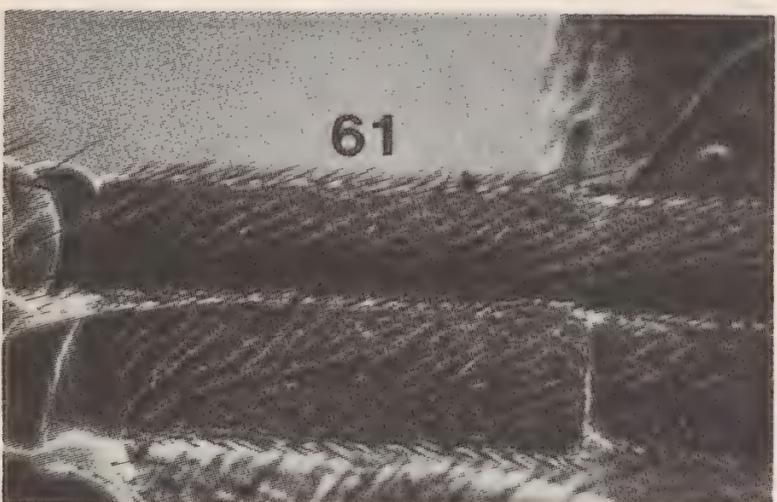
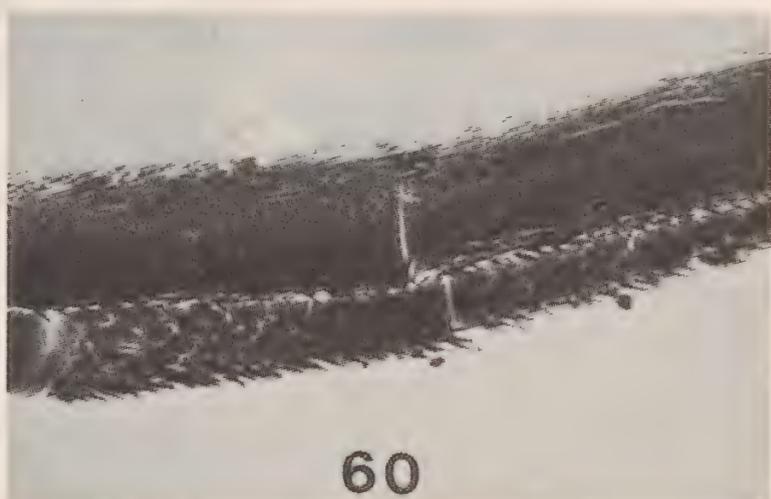
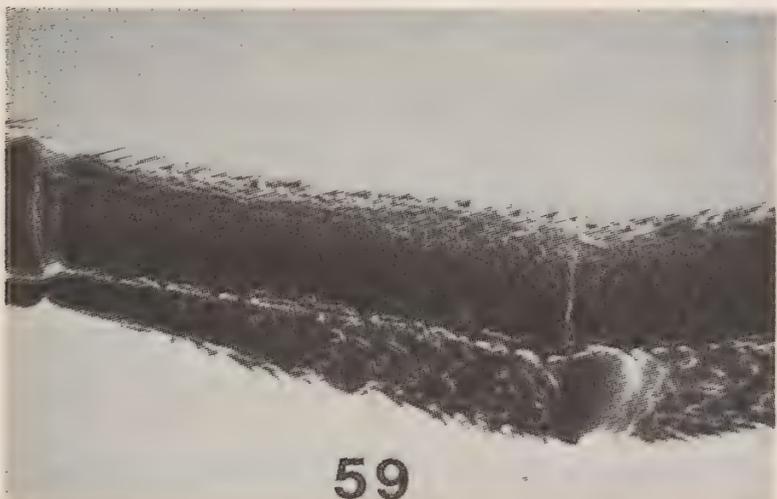
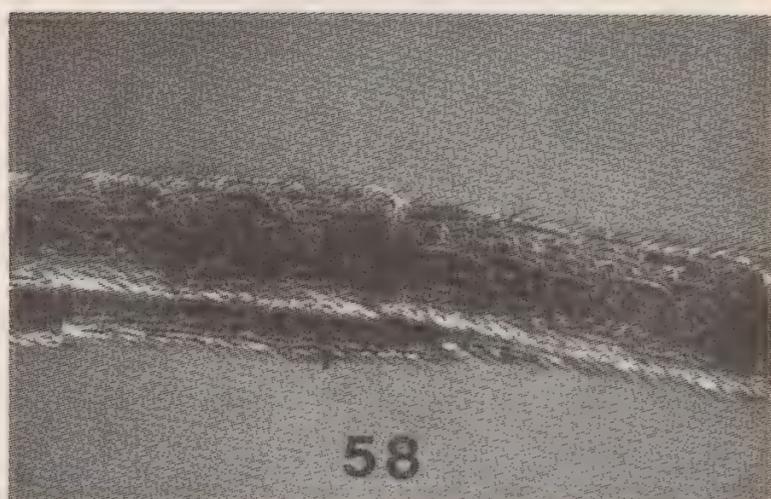
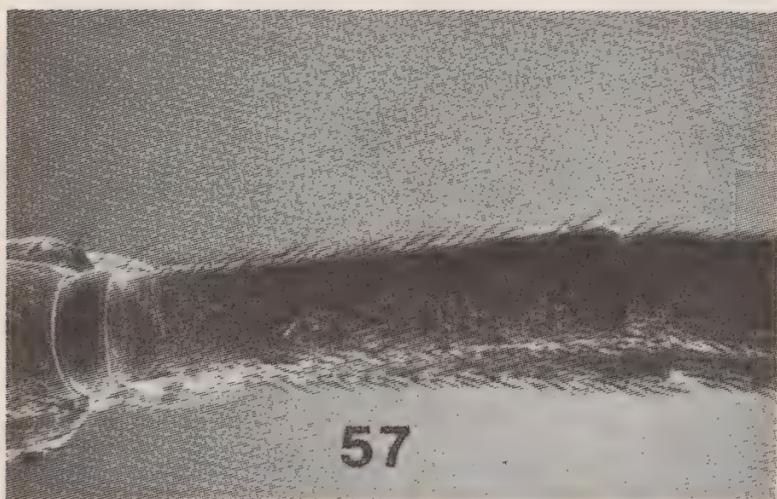
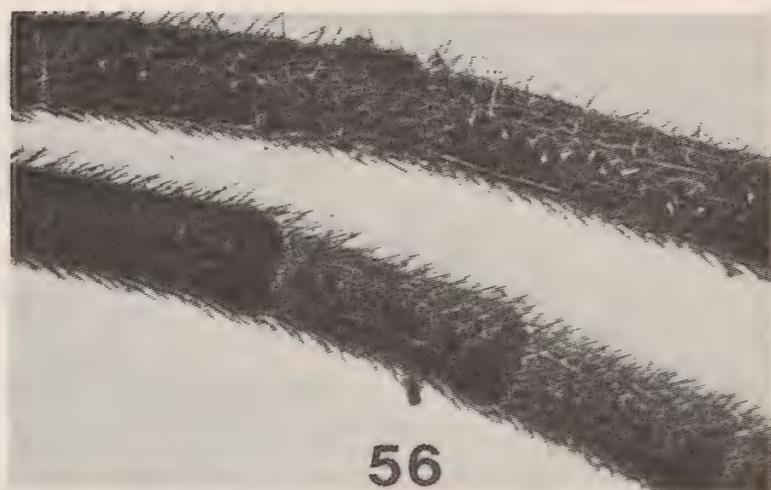
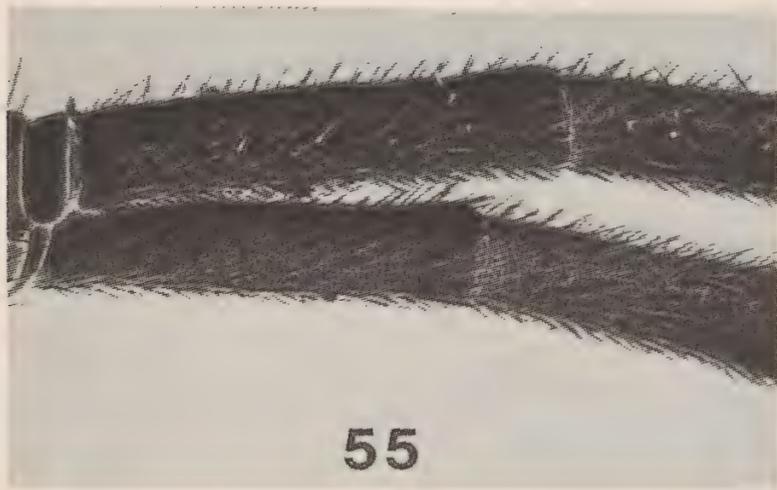
Figs. 34-38. *Delomerista diprionis*: 34, Propodeum. 35, Tergites II, III. 36, Flagellar segment I. 37, Flagellar segments II, III. 38, Ovipositor tip. Fig. 39. *D. japonica*, ovipositor tip.



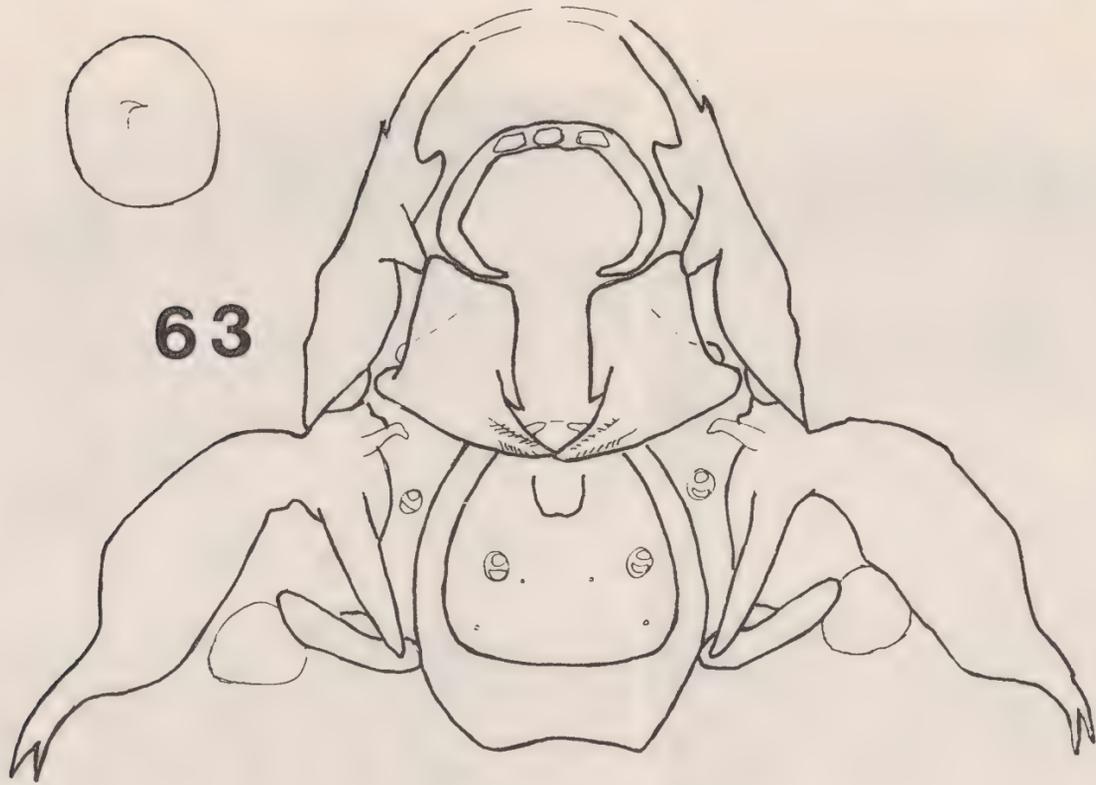
Figs. 40-46. *Delomerista indica*: 40, 41, Propodeum. 42, 43, Tergite I. 44, Ovipositor tip. 45, Flagellar segments I, II. 46, Flagellar segments II, III.



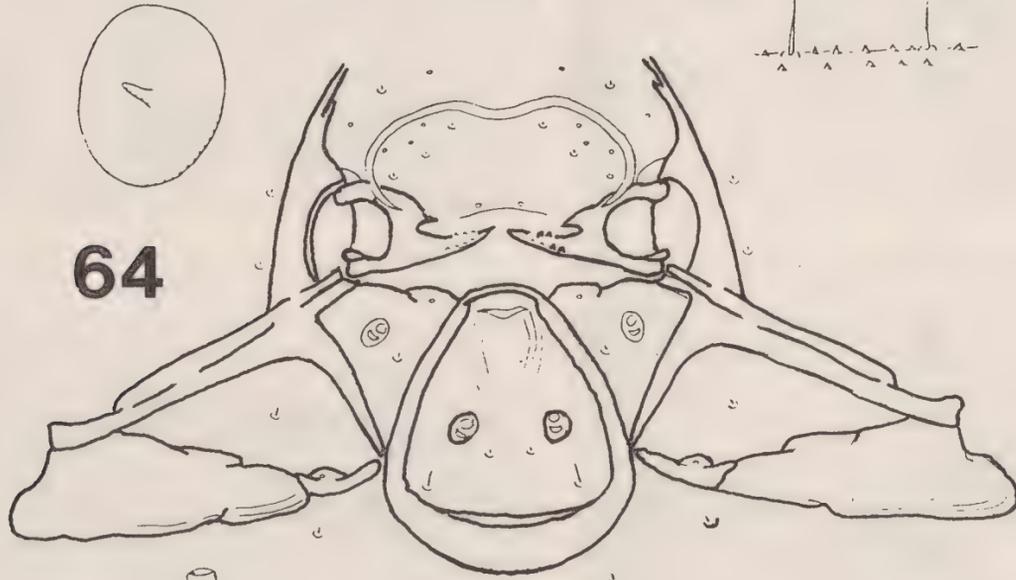
Figs. 47-54. *Delomerista strandi*: 47, 51, Ovipositor tip. 54, Propodeum and first tergite. *D. mandibularis*: 48, 49, Ovipositor tip. 50, Propodeum and first tergite. *D. laevis*: 52, Ovipositor tip. *D. longicauda americana*: 53, Ovipositor tip.



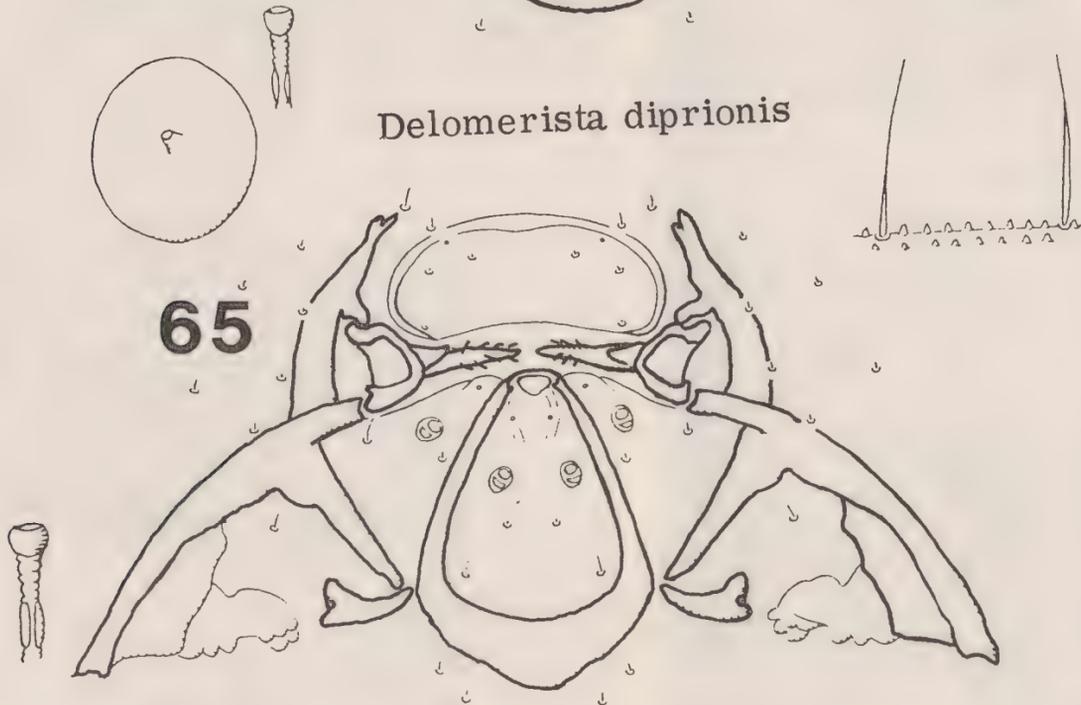
Figs. 55-62. Basal flagellar segments. *Delomerista longicauda americana*: 55, Segments I, II. 56, Segments II, III. *D. strandi*: 57, Segment I. 58, Segments II, III. *D. mandibularis*: 59, Segment I. 60, Segments II, III. *D. laevis*: 61, Segment I. 62, Segments II, III.



Delomerista novita



Delomerista diprionis



Delomerista japonica

Figs. 63-65. Larval heads of: 63, *Delomerista novita* 64, *D. japonica* 65, *D. diprionis*.